ConSus: A Decision Support Tool for the Procurement of Sustainable Social Housing

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Submitted for the degree of Doctor of Philosophy

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June 2005

Abstract

In terms of policy level interpretation there is a general consensus on the principal of sustainability. The UK Government has adopted the principles of sustainable development and encourages its integration into all publicly funded construction work. Social housing projects have a requirement to demonstrate sustainability, yet the people involved in their procurement have a varied understanding of the term. The research explores the interpretation of sustainability from the perspective of a housing association and develops a model of sustainability for the procurement of social housing.

A grounded theory approach is used to explore the interpretation of sustainability in the procurement of social housing. A set of paradigm models are developed that explain the fundamental contextual issues and actions relating to sustainable development of social housing. The findings are confirmed by a national survey of the social housing sector that provides a snapshot of the industry. This confirms that a gap exists between policy and practice and highlights a need for a structured approach to delivering sustainability in a building project. A mixed methodology is used to develop a framework for stakeholders to reach consensus on sustainability in the procurement system. Based on the Delphi method, ConSus, is a web-based decision support tool enabling the explicit integration of sustainability into the procurement process. This approach provides a practical tool for use in the social housing sector.

Acknowledgements

I wish to thank my supervisor, Dr Chris Fortune for the invaluable support and guidance he has given me over the last three years. He has provided remarkable insight into the research process and given me the opportunity to learn from his experience. He has provided direction when needed and encouragement and inspiration to keep me going.

I also wish to thank my parents and my aunt for the assistance they have provided at various points along the way, not least in the final stages of writing up. The support of my family and friends has been an essential part of completing this thesis. Lastly, I wish to thank my son, for his patience in losing his mum to research for far too many hours each day.

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Chapter 1 Introduction

1.1 Background to the study

> *Sustainable development is a dynamic process which enables all people to realise their potential, and to improve their quality of life, in ways which simultaneously protect and enhance the Earth's life support systems.*
> (Forum for the Future: Annual Report 2001:1)

The concept of sustainability which is often associated with green design and the environmental lobby has now evolved to encompass social and economic factors. It has now been acknowledged that there is more to sustainability than minimising the impact of a building on the environment. The term sustainability has become widespread, used to describe an approach to development as opposed to specific activity. Delivering a project, while addressing social, economic and environmental sustainability has become increasingly complex.

So what is sustainable development? In terms of policy level interpretation there is a general consensus on the principal of sustainability.

> *Sustainable development seeks to meet the needs and aspirations of the present without compromising the ability to meet those of the future*
> (Bruntland 1987:1)

This definition emerged out of a United Nations conference chaired by Gro Bruntland and is the most commonly used definition of sustainability to this day. It encapsulates a need for development to protect the planet for future generations while at the same time improving the quality of life for the present day. The idealism of this approach has been widely accepted and derivations can be found anywhere from high level government policy documents and community driven frameworks.

Sustainable development does not emerge from the policy definitions alone. It depends on the actions and practices found at project level. For the successful delivery of sustainable development it must be an integral part of the procurement process. There is an assumption that those being asked to implement sustainable development will have a common understanding and therefore a clear direction in delivery of policy. However the process of turning policy into practice often results in a diversity of understanding.

The significance of the construction sector to the success of sustainability was recognised at the 1992 Rio Summit with the formulation of Agenda 21. This agreement had the aim of harmonising action in terms of sustainable construction and the built environment on worldwide, national and local levels. The UK Government has since adopted the principles of sustainable development and encourages its integration into all publicly funded construction work. Rethinking Construction (Egan 1998) highlighted the need for drastic improvement within the construction industry as a whole. Social Housing was identified within this report as the sector most able to deliver improvements to the housing industry and the Housing Forum was launched to drive an agenda of change for housing. In 1999 a working group was set up to investigate the principles of sustainability in social housing. It soon became clear that sustainability was a vital ingredient to providing the sought after improvements in the housing sector. This led to the housing agencies adopting sustainability as a funding criterion.

Housing Associations (HAs), the providers of social housing, are faced with a requirement to develop sustainable social housing projects in order to secure funding from the housing agencies. The problem faced by both funding agencies and the housing associations is how to transfer policy into practice. The HAs must develop proposals that will in the first instance successfully secure funding and more importantly deliver sustainability in the housing it is providing. The housing agencies need to be able to judge the housing schemes being put forward for funding

to ensure that they are funding sustainable development. The sustainable development policies developed by the HAs reflect closely the sentiment of the 'Bruntland' definition of sustainability. Reference is made to social and economic sustainability yet the majority of indicators and measurement criteria are based on environmental sustainability. This imbalance suggests an obstacle exists to the delivery of sustainability through the procurement process.

The Housing Forum also sought to encourage partnering through the procurement process. Partnering is now central to the housing agencies' strategies for improving procurement of social housing. It has been suggested that the attributes of partnering are essential pre-conditions of achieving sustainable construction (Addis and Talbot 2001). HAs and their consultants and contractors will have to reach a mutual consensus on the definition of sustainability at project level if it is to be achieved within the overall procurement process. There is a need to link the policy, regulation and guidance to respond to the individual project circumstance.

In theory the difficulty in meeting the holistic goals of sustainable development policies is evident at project level. The ability of short term project objectives to address the long term altruistic goals of sustainability is limited. In practice evidence of creating buildings with one sustainable feature demonstrates a myopic rather than holistic approach to sustainability. Social housing projects have a requirement to demonstrate sustainability, yet the people involved in their procurement have a varied understanding of the term. It is perhaps inevitable that a mutual understanding will always be intangible on such a massive concept or that any single project can hope to achieve 100% sustainability, whatever that may be. The thesis seeks to investigate how a definition of sustainability may be achieved for an individual project or programme and explores the perceptions of sustainability that are emerging in the social housing sector.

The research set out to investigate sustainable procurement of social housing. The

research investigated the ways in which sustainability is understood at project level and set out a comparison with the policy documents that exist to guide those involved in procurement of social housing. The research involved a mixed methodological approach. Individual qualitative interviews were held to help shape the problem. A national survey of social housing providers was conducted to establish trends in the understanding of sustainability and finally a project based delphi study was conducted to create a picture of what sustainability means to a group involved in a large scale social housing development programme. The research aims to establish a framework for making sustainability explicit for a project, while setting it against a wider policy context. The specific aims and objectives of the research are developed in the following section.

1.2 Aims and Objectives

The research is concerned with how sustainability can be delivered at project level. It aims to consider the procurement of social housing project within the global definition of sustainable development and seeks to develop a framework to enable sustainable project procurement. The research was carried out within the context of the UK social housing sector.

In procurement there are two distinct aspects of sustainability. The processes involved in procuring the product and the product itself. Both of these aspects are equally important to achieving sustainability. The construction industry tends to be concerned with the processes and the client is focused on the product. The sustainability of one does not necessarily have an immediate dependence on the other. With this apparent disparity of values, there is a danger that sustainability is not delivered effectively through the procurement system.

Sustainability in social housing has become a mainstream objective of the UK

housing agencies. These government bodies have recently changed funding criteria to include the provision of sustainability within the procurement process. HAs and those involved in the procurement of social housing must demonstrate an understanding of the principles and practices required to deliver sustainability if indeed they are to compete against other housing associations for a limited amount of financial resource. There is a tendency within the housing agencies to refer to sustainability in both a finite and infinite sense. The Housing Forum defines sustainability as *a goal or vision that forward looking organisations are working towards* (Housing Forum 2004). The housing agency, Communities Scotland measures sustainability by the amount of CO_2 produced and the number of brownfield sites utilised. This dubiety reinforces the difficulty experienced by those involved in social housing procurement.

The initial literature review proved fundamental to the direction that the research took. It became clear that the research problem was not well defined. An apparent lack of consensus on the meaning of sustainability at project level provides a barrier to its delivery. There is a strong environmental bias to the interpretation of sustainability and the proposed indicators of its implementation. This does not encourage the holistic view of sustainability to filter down to project level where it must be delivered. The literature review established a need to explore what sustainability means in the context of a social housing project. Without a clear definition there is limited potential to set about devising systems for its delivery.

An important aspect of delivery of sustainability is the procurement system itself. Partnered procurement will form the basis of substantial change in the procurement of social housing and the housing agencies are encouraging it in the development of publicly funded social housing where appropriate. It has been casually linked to sustainability yet no research exists to establish if there are real benefits in terms of delivery. Long-term thinking and mutual goals, characteristics of partnering are also essential to sustainability. The research seeks to bring the concepts of partnering and

sustainability together and consider if a collaborative or partnered approach to procurement is the key to delivering sustainability.

The research therefore seeks to address three key questions:

1. What are the key features of sustainability to be considered in connection with the delivery of a social housing project?
2. How can sustainability be defined within the procurement system?
3. Is a collaborative or partnered approach to procurement the key to delivering sustainability?

In addressing these questions the main aim of the research emerged. The focus shifted away from an initial concern with delivering the high level sustainable development policy aims. The research became focused on the definition of sustainability at project level. This primary aim emerged to develop a framework to define sustainability within the procurement system. A secondary aim was to evaluate partnering as a vehicle for delivering sustainability through the procurement process. In order to fulfil these aims the objectives of the research are:

Objective 1. Explore how the global definition of sustainable development permeates the procurement of a building project

Objective 2. Investigate the relationships and connections between the procurement system and the global environment

Objective 3. Establish the features of sustainability that are relevant to the procurement of social housing.

Objective 4. Investigate the benefits that are associated with partnering and consider the ability of the partnering process to deliver sustainability.

Objective 5. Develop a decision making framework to integrate sustainability into the development of social housing.

Each of these objectives is a part of a holistic approach to addressing the main aims of the research. The following section describes the main elements of the research design.

1.3 Research Design

Investigation of a phenomenon provided the initial approach to the research. The research design was an iterative process developing as the literature review progressed. It became apparent that sustainability was an extremely broad and complex concept. The importance of treating the research topic in an holistic manner was evident from an early stage. Much of the published research that was reviewed, failed to address the broad definition of sustainability. Systemic or holistic approaches were being advocated yet little empirical research had emerged that demonstrated this approach. The literature review proved a vast task as the problem unfolded into an array of individual areas for consideration. This reinforced the need for a systemic approach to the research design. The complexity of sustainability that was encountered in literature led to the consideration of systems thinking as a conceptual framework to assist in developing understanding in the subject. Soft Systems thinking enables the researcher to develop a series of models that are tested in the real world in order to identify and put into place change that will improve the performance of a system. The procurement system had been isolated from the main body of thought in the sustainability research and systems thinking was used to integrate the procurement system within the global environment that is such an important aspect of sustainability.

There was a general understanding of the need to integrate sustainability into the procurement process, combined with the emerging procurement framework of partnering. The aim of the study is to develop a framework or decision support model that housing associations and their professional consultants can use to integrate sustainability into the procurement process. The desired result is a mechanism that can be used to promote a more sustainable procurement process and

a more sustainable housing product. In Chapter 2, research approaches to sustainability are considered in more detail. It was thought that due to the complexity of the problem, the use of more than one research method would be beneficial and arguably essential to address the multi-faceted nature of sustainability. According to Punch (2000) quantitative and qualitative approaches both have their strengths and weaknesses, and that they can and should be combined where appropriate.

The research has unfolded in a series of research phases. Each phase has been conducted within the overall conceptual framework to address the objectives in a logical manner, each phase building on the previous.

Phase 1 Literature Review and Methodological Development

Objective 1: Explore how the global definition of sustainable development permeates the procurement of a building project

The literature reviewed focuses on the concept of sustainability in the built environment. A general investigation of the concept of sustainability and its evolution at global national and local levels was undertaken. Key concepts and ideas are established in relation to the social housing procurement process.

Conceptual Framework

Objective 2: Investigate the relationships and connections between the procurement system and the global environment

The conceptual framework was developed by an iterative process between the literature review and an evaluation of the methodological approaches found in the construction management discipline and the approaches emerging in the field of sustainable development. The conceptual framework adopted for this research makes

use of Soft Systems Methodology (Checkland 1978), which is a systemic framework within which various research methods can be employed. This allowed the flexibility to explore the research area, while providing a framework to help understand the complexity found within sustainability.

Phase 2 Development of a Grounded Theory of Sustainability

Objective 3: Establish the features of sustainability that are relevant to the procurement of social housing

Sustainability in the social housing sector is a fairly new phenomenon and the majority of research has taken a top down approach [Harris and Holt 1999; Theaker and Cole 2001]. This part of the study seeks to provide understanding from the project stakeholder level up. An exploratory study was carried out to develop a profile of sustainability in the social housing sector. A Grounded Theory (Glaser and Strauss 1967) approach was used to develop a theoretical framework from a bottom up approach. Grounded theory is important in that it allows broad issues to be understood from the perspective of the individual expert practitioner involved in the process. It is especially useful in developing theory, where there is none.

Phase 3 National Survey of Social Housing Providers

The Grounded Theory research led into Phase 3. The features emerging out of the exploratory study were developed into a national survey of the social housing providers to establish the general understanding of the concepts of sustainability and partnering. The aim was to establish if these emerging issues are representative of the wider population. The questionnaire was widely circulated to developing Housing Associations across the UK. The process was used to confirm the relevance of the features from the first phase of research. The commercial aspect of the procurement process requires an element of prioritisation. The survey was also used

to establish the features of sustainability that take priority within the pressures of the procurement process.

Objective 4: Investigate the benefits that are associated with partnering and consider the ability of the partnering process to deliver sustainability

The survey captured data on the features of partnering thought to bring most benefit to the procurement process and which forms of procurement were best able to deliver sustainability.

Phase 4 Development of Consensual Sustainability Model

Objective 5: Develop a decision making framework to integrate sustainability into the development of social housing

Soft Systems methodology (SSM) is cyclical in nature and involves a concept described by Schon (1983) as the 'reflective practice cycle'. It incorporates revisiting the problem on a regular basis and learning from experience. It is highly adaptive to change and is designed to cope with the social process of continual negotiation and renegotiation of relationships with the real world. The final phase of research develops and tests a 'model' to make explicit the features of sustainability relevant to a particular set of stakeholders. The model is based on the Delphi method (Linstone and Turoff 2001). This method allows the combination of both qualitative and quantitative approaches and is considered a useful tool to incorporate rich qualitative data into a quantitative framework. This creates a holistic approach that allows the values associated with sustainability to emerge within the commercial environment of the procurement process. The final phase of research is concerned with the practical application of the model in the procurement of social housing.

SSM is used to structure the research process. Each phase of research is conducted within the framework of SSM. The overall aim of the research is to connect the project sustainability criteria with the sustainability criteria of higher order systems (UK Sustainable Development agenda, Local Agenda 21, Sustainability Development Policy, etc.). In doing this it will be possible to develop a model that relates decisions made within the procurement system and the potential impact that the decisions have on the project environment and its global setting.

1.4 Framework of the thesis

The thesis reports the research work over eight chapters. Each chapter is supported by a reflection on the research process and any issues that emerged out of that particular section of the research.

Chapter 1 provides an introduction to the research topic. It discusses the main issues that are of concern to the sustainable procurement of social housing and presents the aims and objectives of the research and a brief overview of the research design.

Chapter 2 is a review of the literature and is divided into three sections. The general concept of sustainability is explored and the relevance of sustainability to construction procurement is investigated. The context of the research is presented in a second section on the development of social housing and the issues surrounding this area. The last section of the literature review considers partnering and the relationships between this form of procurement and sustainable development.

Chapter 3 The methodological approaches found in construction management research in general and sustainability in particular are explored to develop an appropriate research methodology for this research study.

Chapter 4 develops the conceptual framework for the thesis. Soft Systems Methodology is presented as the conceptual framework for the subsequent phases of research.

Chapter 5 reports on the initial phase of primary research. An exploratory study using grounded theory approach aims to develop a theoretical framework for sustainability at the project procurement level. The findings from this phase of research are used to develop the following phase of research presented in Chapter 6.

Chapter 6 presents the findings from a survey of the UK Housing Association sector on the perceptions of sustainability and partnering. The survey also provides evidence on the relationships between sustainability and certain procurement approaches and the nature of the sustainable development policies that the HAs operate.

Chapter 7 develops the Consensual Sustainability Model (ConSus) for establishing sustainability at project level. The conceptual model is then tested within the social housing environment. A combination of the research methods employed in phase 2 and 3 of the research are used in this model based on the 'Delphi method'.

Chapter 8 presents the conclusions of the research. The contribution of the research in the current research landscape is explored and a reflection of the development of the framework and its relationship with the global environment are considered. Further work is suggested and the limitations of the study are presented.

A map of the research 'journey' is presented overleaf in Figure 1.1. This map of the research process shows the relationship of the phases of research with specific activities undertaken and relates them to the individual chapters.

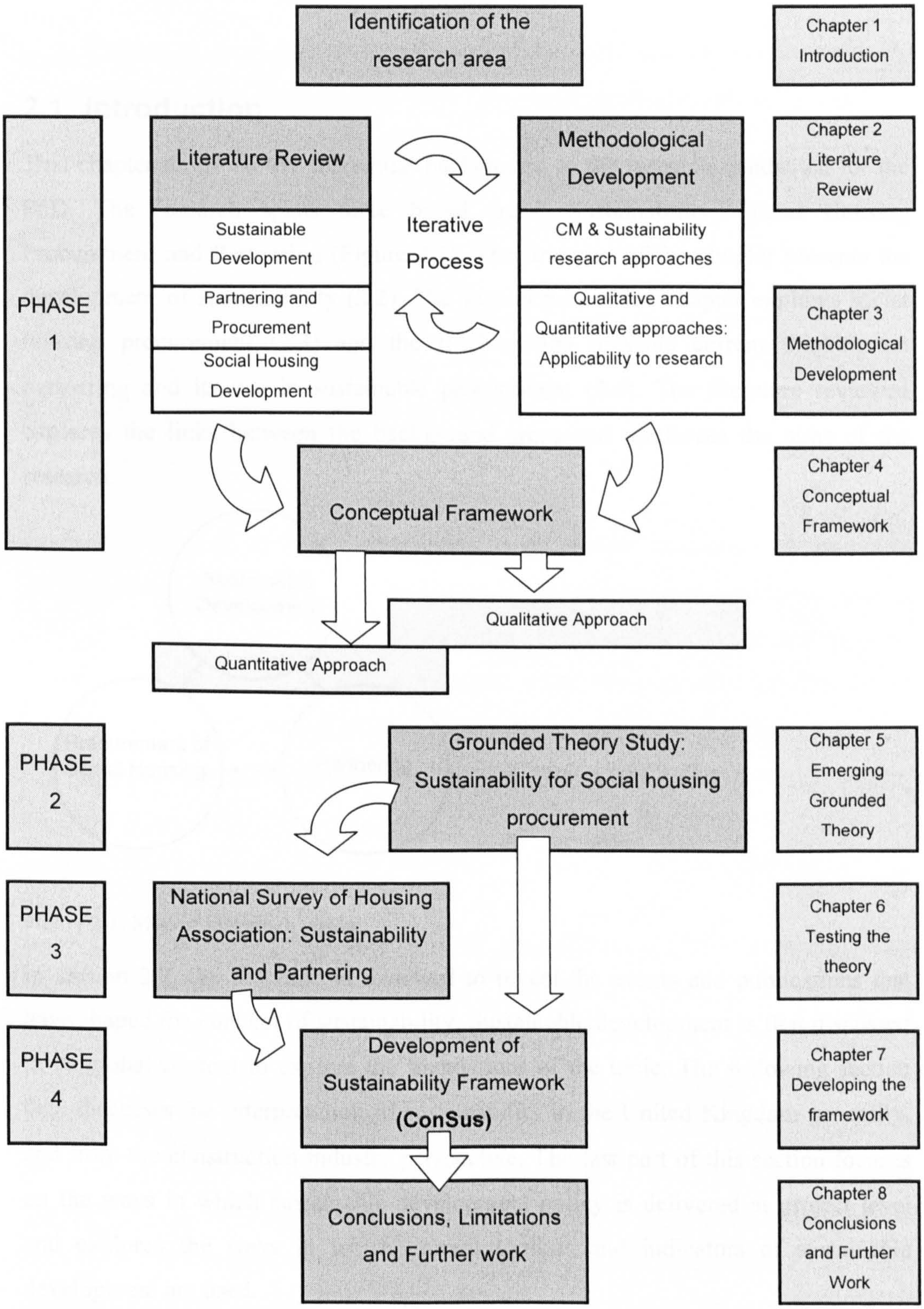


Figure 1-1: Map of the research process

Chapter 2 Literature Review

2.1 Introduction

This chapter develops the contextual background to the research conducted for the PhD. The research spans three broad areas: Sustainability; Social Housing Procurement and Partnering (Figure 2.1). The first part of the chapter presents the development of sustainability (2.2). The second part of the chapter explores social housing procurement (2.3) and the final section presents current thinking on partnering and its use in sustainable procurement (2.4). The literature reviewed explores the links between the background areas and reinforces the aims of the research.

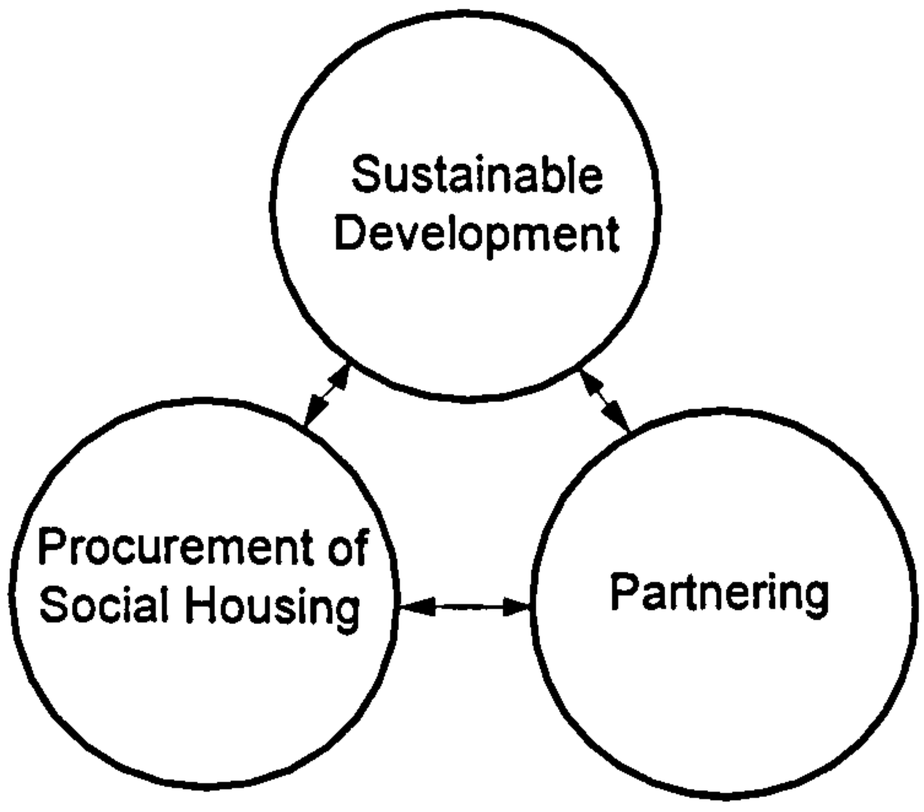


Figure 2-1: Map of literature review

In section 2.2, the literature is reviewed to reveal the events and publications that have shaped the concept of sustainability. Sustainable development is first discussed in its global context to explore the foundations of the topic. The following section then discusses the interpretation of sustainability in the United Kingdom generally, and from the construction industry perspective. The last part of this section focuses on the ways in which sustainable development policy is delivered at project level and explores the ways in which current toolkits and indicators of sustainable development are used.

This research is concerned with sustainable development in the context of social housing procurement. Section 2.3 explores the social housing industry, the pressures affecting the construction of new housing and the procurement methods that exist. The relevance of sustainable development to social housing in its broadest and project perspective is considered through the literature.

Section 2.4 explores the concept of partnering and its use as a procurement framework. The key features and benefits are discussed in respect of social housing procurement. The section concludes with an exploration of the link between partnering and sustainability.

The three strands of literature are reviewed to understand the context of sustainable development from the macro global view to the micro project implementation level. Each part of the literature is intrinsically linked and this chapter aims to provide an overview of the complex relationships that exist between sustainability, social housing procurement and partnering. The chapter concludes with a summary of the literature and some reflections on the process of reviewing the literature.

2.2 Sustainable Development

Sustainable development is not a new concept. It was probably intuitively understood by early civilisations (Hill and Bowen 1997). The concept is experiencing a second genesis, a slow deliberate rebirth in response to a worldwide concern for the ability of our planet to sustain human development in its present state. The definition of sustainable development is a global issue that has captured the attention of world leaders through a vast programme led by the United Nations (UN). Although sustainable development is not purely about environmental issues, concern for the environment has been the driving force behind the global attention it is receiving. This programme is characterised by unanimous agreement at policy

level and hampered by disagreement on putting policy in to practice. This impact can be felt in the tension surrounding the implementation of the Kyoto agreement, aimed at reducing green house gas emissions. This agreement signed by one hundred and forty one nations was notably rejected by USA, by far the largest producer of carbon dioxide, on grounds that it may damage their economy (BBC 2005).

Sustainability in the procurement of construction projects is thought to be a crucial part of the overall sustainability of our planet. Construction projects may have a small individual impact, yet their combined impact on global sustainability is considered significant. The energy used in constructing, occupying and operating buildings represents approximately 50% of greenhouse gas emissions in the UK (Environment Agency 2003). Sustainable development goes beyond environmental issues and aims to improve quality of life. The construction of social housing projects has been influenced significantly by the sustainability agenda. The sector is grappling with the concept under legislative pressure balanced by a genuine ambition to deliver sustainability. Considering the apparent urgency of the need for a more sustainable pattern of existence, sustainable development has been painstaking in its evolution. The following section plots the slow international development of the concept of sustainable development.

2.2.1 Global definition

> *The more clearly we can focus our attention on the wonders and realities of the universe about us, the less taste we shall have for destruction*
> Carson (1954)

Sustainable Development is a concept that has been slow to evolve. Concerns with the environment have been about for many decades. Rachel Carson (1907-1964) published Silent Spring in 1962. This book challenged the unrestrained use of synthetic chemical pesticides and called for a change in the way humankind viewed

the natural world. Its publication is credited with starting the modern sustainability movement and linking the concepts of social well-being with the economy and the environment (IISD 2002).

By the middle of the twentieth century, concern was building over the capability of the planet to sustain the affluent lifestyle of the developed world (Hill and Bowen 1997). In the late 1960s the United Nations began to recognize the need for concerted international action to prevent environmental problems affecting human development and well being. In 1972 the UN Conference on Human Environment in Stockholm was a key milestone in a process that saw the UN and its member states starting to take notice of the environment and the ways in which human activity were impacting on it. The event was the culmination of three year progression from a resolution that stated "*the urgent need for intensified action at the national and the international level, to limit and, where possible, to eliminate the impairment of the human environment*" (UN accessed 2004). Leading up to the conference a draft *Declaration on the Human Environment* was formulated and there was a general sense of hope that a turning point had been reached in the way the international community set about development. The optimism that was engendered by this event failed to lead to immediate action by member states and environmentally damaging development continued at the expense of many parts of the world's ecosystems and its human populations. Many environmentalists believe that the pollution caused throughout the last century has led to a permanent damage to the earth's ecosystems and drastic action must be taken to ensure that a catastrophic situation does not ensue (Demeritt 2001).

During the same period of time, the 'Club of Rome', a think-tank of scientists, economists, Heads of State, and business people, published *The Limits to Growth* (Meadows *et al.* 1972). It was based upon the first research to make serious use of computers in modelling the consequences of a rapidly growing global population. It

seemed to respond to the worldwide concern for the environment, with twelve million copies sold in thirty seven languages. However, it was criticised by developed countries for not including technological solutions and by third world countries for advocating abandonment of economic development. This division of views typifies the barrier to the delivery of sustainability, a failure to agree on the manner in which it should be implemented.

In 1973 the oil crisis caused the western world to take notice and shattered illusions that the global community was willing to take an inclusive position when national economic performance was at stake. The Organization of Petroleum Exporting Countries (OPEC) withheld supplies of petroleum to much of the Western world, causing many nations to take an introspective position on global relations. One benefit of this episode was that it set in motion a sea change in the way oil was used in the developed world. In the ten years following OPEC's actions oil consumption in Western Europe reduced by 2% (BBC 2000). Tax disincentives and a general withdrawal from dependence on oil imports were seen as factors in the increase of low energy alternatives in the built environment.

During the 1970s a minority group of designers began developing solutions for the built environment that sought to use less energy and less environmentally damaging materials. Passive solar architecture became more common and there are many examples of successful projects that were developed during this decade (Vale 1975). This movement did not become mainstream and technological development predominated the direction architecture has taken over the last thirty years.

During the 1980s several global events led to the heightened public awareness of environmental problems. In 1982 a debt crisis swept over the developing world, threatening financial stability across the globe. In 1984 a gas leak killed 10,000 people in Bhopal, India and a drought in Ethiopia killed one million people. In 1985

the Chernobyl nuclear disaster and the discovery of a massive hole in the ozone layer above Antarctica created a sense of despair at the way in which the world was being used and abused by human development (IISD 2002). Public outrage put environmental concerns to the forefront of the political agenda. Environmental groups became more politically active during the 1980s. Greenpeace began a campaign to conserve Antarctica as a World Park. Their action was supported when they received an award for, "*outstanding environmental achievement*", from the United Nations Environmental Programme. It was clear that concerted action was needed on a global scale to halt the destruction of our planet.

The World Commission on Environment and Development was formed in 1983 by the UN and worked for four years under the chairmanship of Gro Bruntland, the Prime Minister of Norway. The commission was convened in response to a resolution stating the aim as a 'Process of preparation of the Environmental Perspective to the Year 2000 and Beyond'. Their work resulted in the publication of *Our Common Future* (Bruntland 1987). This report is often referred to as the 'Bruntland Report' after the chairwoman of the commission. Out of this work came a new definition of sustainability, that remains generally accepted to this day.

> *Sustainable development seeks to meet the needs and aspirations of the present without compromising the ability to meet those of the future*
> (Bruntland 1987)

Recognition of the need for co-operation and 'multilateralism' underpinned the report. A balance between environment, society and economy defined the model of sustainable development. Many policy documents have since emerged based on this definition. The central feature of this approach is an equal emphasis afforded to social and economic progress and environmental protection. While this inherent balance has been widely recognised for the potential to allow development to

continue, some view economic gain and environmental protection as diametrically opposed. Nevertheless, this definition has found general favour at all levels, from government, business and local community.

This report became a catalyst for a widespread global reaction and the definition was endorsed by the UN five years later at the 1992 UN Earth Summit in Rio. This was an unprecedented gathering. 172 governments and 2,400 NGOs were represented (UN 1997). This summit resulted in the adoption of three major agreements: The Rio Declaration; the Statement of Forest Principles; and Agenda 21.

The Rio Declaration was built on a set of principles agreed at the 1972 Conference on Human Environment in Stockholm. The principles represent a philosophy of international cooperation and mutual respect for the environment, society and individuals across the globe. The Statement of Forest Principles set out similar principles in relation to the development, management and exploitation of forests. Agenda 21 is a blueprint for sustainable development across the globe.

2.2.2 Agenda 21

Agenda 21 agreed at the Earth summit in 1992, provides an obligation to all member states to develop a national sustainable development strategy and implement local strategies for the delivery of sustainable development at grass-roots level. Agenda 21 relates most closely to activity taking place at a national and local level and has had the most tangible impact of the three agreements. It sets out principles for wide-ranging action on sustainable development and the United Nations describes it as a comprehensive plan of action to be taken globally, nationally and locally by organizations of the United Nations System, Governments, and Major Groups in every area in which human impacts on the environment *(UN 1992)*.

Promoting sustainable human settlement development is one of the key programme areas of Agenda 21. This part of the programme refers specifically to *Providing adequate shelter for all* and *Promoting sustainable construction industry activities.* The right to shelter is at the heart of Agenda 21. In fact the UN views adequate housing as one of the most basic human rights (UN 1976) and places a legal duty on member states to provide housing to all those in need. This has differing contexts across the world. Each nation has specific problems with the provision of housing some more desperate than others, but there is agreement that housing is closely linked to quality of life. Poor quality housing is often associated with ill-health and other social problems. Agenda 21 aims to address the provision of housing within the overall framework of sustainable development. Recognition of the need for sustainable construction is an important element of Agenda 21. The delivery of housing is dependent on the construction industry and as such is a key stakeholder in the delivery of sustainable housing.

Agenda 21 is described as a *dynamic programme* and is expected to change over time as the needs and circumstances of the world and its nations evolve. There is an onus on each country to report on its sustainable development performance. This element of Agenda 21 creates a particular approach designed to measure the relative performance of nations, regions and communities. The exact measurement of sustainability has remained one of the main areas of concern for its implementation. Bell and Morse (1999) claim that measurement is only possible if something is defined. The exactitude of defining the 'what' that is to be measured is a common difficulty experienced.

Section 40 of Agenda 21 identifies the need for improved data collection and analysis and the development of indicators of sustainable development. It is stated that *commonly used indicators such as the gross national product (GNP) and measurements of individual resource or pollution flows do not provide adequate*

indications of sustainability (Agenda 21 : 40.4). This implies that indicators of sustainability must be more complex to reflect the complexity of sustainability.

The International Institute for Sustainable Development (IISD) established in 1990, commissioned a group of experts to develop an approach to ongoing efforts to implement sustainability. An international group of practitioners and researchers met to discuss ways in which the sustainability agenda could be progressed. This led to the development of the 'Bellagio' principles, a set of ten guiding principles on assessing sustainability. They set out a holistic systemic approach based on an understanding of sustainability from a systems view of the world (Hardi and Zdan 1997). These principles were developed to measure and assess the progress of sustainable development and were designed to assist in the implementation of the assessment of Agenda 21. The principles advocate a holistic approach and provide a broad framework. They are effective in expanding consideration from immediate activity to far reaching impacts. They do not provide specific guidance but strengthen the broad view of sustainability introduced by the 'Bruntland' report in 1987.

Agenda 21 incorporates development on a complex range of issues. Development is used to mean any human activity and Agenda 21 reflects the vast array of areas that this encompasses. It acknowledges that many of the problems and solutions addressed by Agenda 21 have their origins at local level. In response to this, an objective of Agenda 21 was for all local authorities to have a 'Local Agenda 21' by the year 1996, achieving consensus on what sustainable development means for the local community. It is unclear the scale of achievement on meeting this objective. There are certainly many examples of where there has been successful implementation of Local Agenda 21. A survey conducted in 1996 established that more than 1,800 local governments in 64 countries were involved in Local Agenda 21 activities (The International Council for Local Environmental Initiatives 1997).

The adoption of this agenda reflects global consensus and a political commitment to pursue the ideology of sustainable development. Following the Rio event in 1992 there was a significant activity towards establishing sustainable development policies. The UN established a commission on sustainable development the same year to oversee the implementation of Agenda 21. Rio+5 was held in 1997 to revisit and strengthen the commitment to Agenda 21. A new international development target was agreed, that all countries should have a sustainable development strategy by 2002 (SDC 2001).The meeting was a solemn reminder that little progress had been achieved and it was apparent that a lack of political will existed to implement the more difficult aspects of sustainable development, especially those that involved some sort of compromise (ENB 1997). In the same year the Kyoto protocol was signed by member states, committing them to the reduction of greenhouse gas emissions. The protocol finally came into force in 2005 and sets out a clean development mechanism (CDM) for targeted sectors. Construction is identified as one of the key target sectors.

There is mixed opinion on how well the world's nations are addressing the principles set out in Agenda 21. In 2002 the World Summit on Sustainable Development took place in Johannesburg amidst negative publicity from many environmental groups. The International Institute for Sustainable Development (IISD) published a report entitled *Ten and Ten* (IISD 2002). This highlighted ten successes and ten failures since 1992. Most significantly was the breakdown of the Rio agreement. Developing nations had failed to respond to environmental problems, while industrialised nations had failed to remove trade barriers to poorer nations. It is clear that while there is agreement on the principles of sustainable development, there is difficulty in implementing them. Criticism has been levelled at international failure to react to the sustainable development agenda.

Given how lacklustre and patchy the UK's record in sustainable development has been over the past 10 years, the fact that it will be one of the few countries that can hold up its head in Johannesburg is an all too accurate reflection of just how little progress has been made.

Porritt 2002 (Chair of the Sustainable Development Commission)

This is weighty criticism from the head of a government body charged with promoting the delivery of sustainable development and reflects the size of problem that exists. Sustainable development remains the topic of debate between pressure groups and government and looks set to remain a central issue and potential source of tension between nations. The one heavily veiled benefit of this failure is that climate change and the loss of biodiversity have risen up the political agenda (Pearce 2003:5).

A report by the Millennium Ecosystem Assessment (2005) states that sixty percent of the world's ecosystems are being degraded or used unsustainably, and that the harmful consequences could grow significantly worse in the next 50 years. It appears that the problem addressed by sustainable development is increasing and a more effective solution is urgently required.

2.2.3 Response by the research community

The research community has simultaneously grasped the idea of sustainable development. Construction research related to sustainability has risen exponentially since the 1970s. A review of abstracts in construction related databases reveals the trend (Table 2.1).

Table 2-1: Links to Sustainable Development and Sustainable Construction research (Source: Google Scholar)

		1970s	1980s	1990s	2000s
Key word	Sustainable Development	42	501	75,300	70,400
	Sustainable Construction	21 (50%)	69 (17%)	5,730 (7%)	19,600 (27%)

Research under the general heading of sustainable development increased ten fold between the 1970s and 1980s and one hundred fold between the 1980s and 1990s. Research under that name looks set to only increase two fold in this decade. Construction related research increased more modestly but is becoming more dominant in the field of sustainability. There was a three fold increase between the 1970s and 1980s, eighty fold increase in the 1980s to 1990s and a seven fold increase in research is predicted this decade, increasing from 7% of the whole research sector to 27%. Although these statistics do not take into account similar research that is not grouped under the banners of sustainable development or sustainable construction, it gives an indication of the massive increase in interest experienced during the 1990s and the slow but increasingly dominant rise of research conducted specifically in sustainable construction.

The surge in sustainable construction relates to important episodes in the international development taking place within the sustainability context and corresponds with key dates including the 1987 publication of *Our Common Future* (Bruntland 1987) and the agreement of Agenda 21 at the Rio Summit in 1992.

The research carried out earlier in the period studied had a strong environmental bias. A large amount of the research was focused on technical solutions and seems to correspond to the increase in 'environmental design' apparent in the 1970s.

Researchers were active in developing the use of low technology materials; solar design; low energy solutions (Besant *et al.* 1978; Urbanek 1978). Latterly research labelled under the banner of sustainable development has become more centrally focused on the broad issues of sustainability – economic, social and environmental sustainability (Hill and Bowen 1997; Bakens 1997). Research approaches have changed concurrently with the shift in thinking on the meaning of sustainability. The new definition has given a confidence to researchers to address much broader issues on sustainability. Kibert *et al.* (2000) refers to a worldwide change in emphasis experienced since the beginning of the 1990s. Organisations have been referring to sustainable construction and considering the whole life cycle of buildings in terms of the global sustainable development movement. Kibert *et al.* (2000) believe sustainable construction is primarily to do with materials that reduce environmental and resource impacts. This seems to limit the scope of sustainability to an environmental focus, although later on in their paper they suggest that the choice of material can have significant social and economic benefits. The development of a new research paradigm for sustainable development has emerged over the last three decades. This shift in paradigm and specific approaches to research methodology are explored in greater detail in chapter three.

In 1994 the 1st International conference of Sustainable Construction was held in Florida. This was the first large gathering of construction researchers following the adoption of Agenda 21, attended by 300 delegates from 30 countries. The research presented at the conferences demonstrated the strength of engagement the research community had with regard to sustainable development. The conference addressed the definition of sustainability in its broadest sense and while there were a large percentage of technical papers the general theme of sustainability emerged with a much broader context.

The measurement of performance was a central theme to the conference and brought together significant thinking on what constitutes a sustainable building. A comparison was drawn between traditional performance measurement of buildings and what could be termed sustainable buildings (Table 2.2). The traditional measures of building procurement, time, cost and quality were contrasted with areas seen to be vital measures of sustainability. Charles Kibert, the chair of the conference has a keen interest in the influence of building materials on the sustainability of the built environment. This influence can be seen in the materials emphasis of the proposed sustainability performance criteria. While they constitute an important definition of sustainability criteria they fail to recognise the baseline economic pressures of construction procurement.

Table 2-2: Traditional versus Sustainable criteria for buildings (from Kibert 1994)

Traditional Criteria		Sustainability Criteria
• Performance		• Resource depletion
• Quality		• Environmental degradation
• Cost		• Healthy environment

The issues of embodied energy, greenhouse gases and toxic generated/content were additional concepts that reinforced the materials emphasis of the conference. In terms of the built environment, sustainable development was now considered an important issue. At this conference on Sustainable Construction, sustainability was defined as:

> *the creation and responsible maintenance of a healthy built environment based on resource efficient and ecological principles"*
> (Kibert 1994)

This definition was specific to the construction sector but acknowledged the changing concept of sustainability at large. This conference marked the advent of a

significant body of research conducted throughout the last decade that has seen the advancement of the concept of sustainability within the construction sector and procurement sector.

The International Council for Research and Innovation in Building and Construction (CIB) recognised the role it had to play in implementing sustainability through the construction of buildings. Over the last decade the CIB has organised a number of conferences and overseen task groups and working commissions around the theme of sustainable construction. In 1995 the CIB adopted sustainable construction as a key theme for its research. The subsequent research activity culminated in the 1998 CIB World Congress in Gavle, Sweden. Here, sustainable construction was formally recognised as one of the three priority themes of the CIB aimed at encouraging international research in this area. One of the major themes of the conference was managing for sustainability and coming strongly out of the published research was a focus on social and economic aspects of sustainability. The conference succeeded in shifting the focus from technical solutions to broader debate on implementation of the concept of sustainability through the built environment. Acknowledgement was made of the shortcomings of existing construction practices and the lack of knowledge that exists to base informed decisions on. The following year CIB published *Agenda 21 on Sustainable Construction* (Bourdeau 1999). This document defined the construction industry and the built environment as vital components to the attainment of sustainable development. It set out the main issues and challenges the CIB believe are vital to the success of Agenda 21. These issues are suggested as the key themes to be adopted for research and development, as follows:

- Management and Organisation
- Product and Building issues
- Resources consumption
- Environmental loads

- Impacts of construction of sustainable urban development
- Social, cultural and economic issues

As can be seen from above the social and economic aspects are relegated to the end of the list, due, the authors claim to them being *far less developed in the literature.* Although acknowledgement is made to the major socio-economic aspect of the construction industry, it is clear that social and economic sustainability is still a secondary issue.

In 1997 Hill and Bowen published *Sustainable Construction: principles and a framework for attainment.* This was the first research to seriously address the triple bottom line model of sustainability in the construction sector. They proposed a four pillar approach which divides environmental sustainability into technical and biophysical sustainability. The approach suggested is supported by a detailed framework for attaining sustainability through a construction project. The proposal relies on the existence or creation of an Environmental Management System (EMS), which limits

The leading international construction journal, *Building Research & Information* published a special issue on sustainability in the built environment. Non-technical or 'soft' issues were recognised '*at least as crucial for a sustainable development in construction [as technical issues]'* (Sjöström and Bakens 1998). Du Plessis (1998) is deeply critical of the way in which sustainability is developed without due regard to the social impact it has. He argues that *sustainable development is in danger of becoming just more politically correct jargon* (Du Plessis 1998: 388). Brandon (1999) agreed that an approach is needed that differs from the reductionist thinking associated with traditional measurement tools.

Since 1998 there has been a steady stream of research that challenges the construction industry on its approach to sustainable construction. The Green Building Challenge was an international study of assessment methods used in twenty countries. It sought to bring together best practice in the measurement and assessment of sustainability. The research was a partial success and advanced thinking in the area of life cycle assessment (Larsson and Cole 2001). Subjectivity in measurement was cited as a barrier to successfully comparing the performance of one project against another. Controversially, Cole (2001) suggests that a shift towards a holistic approach towards sustainability may not be possible before adequate measurement tools are in place.

2.2.4 UK Sustainable Development Context

The UK government claim that they were one of the first nations to respond to Agenda 21. The first *UK Sustainable Development Strategy* (HMSO 1994) initiated by the then Conservative government created the foundation for a decade's activity focused on the integration of sustainable development into the public sector. *A better quality of life - a strategy for sustainable development in the United Kingdom* (DETR 1999) identifies four objectives, namely; social progress; protection of the environment; prudent use of natural resources; and economic growth and employment. Following publication of this document a set of fifteen headline sustainability indicators aimed at measuring performance was published.

Table 2-3: UK headline indicators of Sustainable Development

Economic	Social	Environmental
Economic output	Poverty and exclusion	Climate change
Investment	Education	Air quality
Employment	Health	Road traffic
	Housing	River water quality
	Crime	Wildlife
		Landuse
		Waste

Scotland meanwhile developed twenty four separate indicators, Wales twelve and Northern Ireland an alternative set, all designed to relate to specific priorities and circumstance (DTI 2004). These indicators have been used to report on progress annually and provide a 'barometer' of the quality of life.

Housing is one of the headline indicators in the UK strategy (although these apply only in England). This is measured as the percentage of households living in non-decent housing. The statistic for the social housing sector indicates a drop in households living in non-decent housing from 51% in 1996 to 37% in 2001. This still represents a significant problem with the standard of housing across England. The Scottish indicators cover the same basic areas but are divided to represent the way in which data is collected in Scotland. Housing is represented by 'Fuel Poverty' and 'Social concern' measuring the number of households classified as homeless. This range of sustainability indicators is supplemented by indicators developed by individual industries and sectors. The indicators are designed to measure the performance of the UK in terms of sustainable development. Seventy of the one hundred and fifty national sustainable development indicators can be linked to housing and community issues (Housing Corporation: no date available). This places housing centrally in the movement to improve sustainability in the built environment. This confirms the importance placed on housing in the UN Agenda 21.

The Local Government Act 2000 places a duty on local authorities to prepare community strategies which 'improve or promote the economic, social and environmental wellbeing of their areas and contribute to the achievement of sustainable development'. There is freedom to utilise the Agenda 21 framework from the UN or to utilise an alternative approach. There is evidence that local authorities are choosing not to use Agenda 21 resulting in a concern that the community plans might either fail to address sustainable development issues or will duplicate past

work in this area and fail to draw on the experience and lessons from ten years of LA21 delivery (Lucas *et al.* 2003).

The range of initiatives and frameworks presented by departments and organisations charged by the government built around the UK sustainable development strategy have created an wide range of actions by public and private organisations. Legislation is sometimes perceived as the only driver for change to the construction industry. Changes to legislation have delivered changes in practice that have borne real benefits. Landfill Tax, the Climate Change Levy and revisions to Building Regulations have forced beneficial changes in construction sector. However, much of the action to date has been voluntary, as the professions act according to personal commitments and government guidance (The Sustainable Construction Task Group 2003).

Since the publication of the Sustainable Development strategy in 1994, there have been numerous evolutions of this document. Its latest manifestation is *Securing the Future* (DTI 2005). The key shift from the original strategy is a more focused approach to the delivery of sustainability. This change in emphasis recognises the difficulty in translating the laudable aims of sustainable development into practice. In a review of the UK Sustainable Development strategy it was observed that *the overall approach ....should be focused on delivering sustainable development* and that some of the wording is *weak* (British Ecological Society 2004).

Nick Raynsford, the UK minister for construction, addressed the CIB conference in 1998. He reinforced the position of the UK governments to address social, economic and environmental aspects and consider long term as well as short term impacts. The strategy also identifies the construction industry as having a key role in the delivery of sustainability (Moore *et al.* 2000). Raynsford (1998) suggests that there is only a limited role the government can take without engagement by the construction

industry. Legislation and regulatory frameworks are in place but the real challenge lies with changing the attitudes and cultures embedded in the industry.

2.2.5 The construction industry perspective

The construction industry was recognised in the 1990s for the role it had to play in the development of a sustainable built environment. As an industry it has been slow to react to the agenda. Although the UK strategy for sustainable development was in place in 1994, a specific strategy for the construction industry was slow to emerge. Following consultation with the industry, the Government published 'Building a better quality of life - a strategy for more sustainable construction' in April 2000. It claims to be a milestone to a more socially and environmentally responsible, better-regarded construction industry (DTI 2000). Six indicators of sustainable construction were devised for use on individual projects:

- operational CO2 emissions (kgCO2/m2/year);
- embodied CO2 (kgCO2/m2);
- water consumption (m3/person);
- waste in the construction process (m3/100m2floor area);
- biodiversity (under development);
- transport associated with the construction process (still under development).

This legislative backing has instigated change in the building sector's attitude to sustainability. The introduction of policy on sustainable construction has seen many commercial organisations implement their own strategy. Carillion, one of the largest UK construction companies initiated a sustainable development programme in 1994 to implement and promote sustainable construction. This seems to indicate that sustainability must be delivering business benefits to commercial organisations. The scheme was expanded and upgraded in 2000 (Carillion 2001).

The Building Research Establishment (BRE) and the Construction Industry Research and Information Association (CIRIA) both launched campaigns to promote a better understanding of sustainability in the construction industry. CIRIA adopted sustainability as one of its themes and has published a number of construction guidance documents on sustainability. They maintain an environmental emphasis to the scope of the reports (CIRIA 1995; Venables *et al* 2000). This research bias was recognised by the author of a recent report on Sustainable construction (Addis and Talbot 2001) at its launch in a seminar held in Edinburgh (Talbot 2002). It was acknowledged that the report moved from a totally environmental bias to one that was closer to the balanced view of sustainable development promoted in the Bruntland (1987) report. BRE have conducted significant research into sustainable construction. Howard (2000) reviewed the construction industry's perspective on sustainability. Environmental factors constitute five areas of concern, while economic and social factors account for one area each. This balance was redressed with the publication of *Reputation, Risk and Reward* (Crossley 2001). Economic and social responsibility is strongly presented in terms of business reputation. Research sponsored through these organisations appears to be shifting from a strongly environmental and technical bias, to one that acknowledges business processes, economic and social accountability.

Commitment to improving the sustainability of the built environment was confirmed by the Better Buildings Summit in 2003. The aim of the conference was to establish ways to deliver better, greener buildings, faster. The event was a high profile gathering of government ministers, construction stakeholders and researchers and sought to galvanise action to improve the performance of the construction industry. It chose to focus on Energy efficiency; Renewable energy and the related issues of minimising waste and conserving water (DTI 2003). This imbalanced approach means that the social progress and economic benefit have been set aside in favour of

the manageable and tangible aspects usually associated with environmental sustainability.

The Sustainable Buildings Task Group was launched at the summit. The organisation which includes representatives from industry and government was charged with promoting sustainable development through the built environment. Their remit was to achieve better environmental performance in new and existing buildings, and improve significantly performance on key issues including water, energy, waste and building materials such as timber. There is no reference to social or economic issues. The task group published its final report in 2004 and it reinforces the environmental emphasis that is evident in the groups remit.

> *The built environment is at the heart of our economy. It shapes how we all live our lives. But the manner in which it consumes natural resources means that it is responsible for some of the most serious global and local environmental change. The way we use natural resources for building and the levels of pollutants emitted in the process of building, and in the use of buildings once occupied, are unsustainable. The construction industry must embrace more sustainable forms of building.*
> (Sustainable Building Task Group 2004)

The government launched the Communities Plan in the same year. It commits £22 billion in funding for new housing in England. This initiative redresses the balance in favour of social and economic sustainability. The approach achieves the balance by focusing action on the long term objectives of providing a sustainable community rather than the short term practice of producing housing. The delivery of a large proportion of the funding is administered through the housing agencies.

2.2.6 Indicators and Toolkits

How is sustainability measured? How can we know what the objectives are? How is it possible to know if there is progress being made? Bell and Morse (1999) describe these questions as a conundrum. They argue that sustainability has much in common with truth and justice, based as it is on value judgements and ethics, but it must be put into practice by *imperfect human beings.* If sustainability is to be treated as a goal or objective, then a suitable measure must be adopted to establish if the goal has been reached.

> *A vast, and potentially confusing, array of initiatives on environmental and sustainability indicators are under-way inside international governmental organisations, such as the UN, European Union, OECD and World Health Organisation*
> (Cox *et al.* 2002)

BEQUEST Toolkit

The BEQUEST toolkit was produced by a pan-European network with EU funding. It was founded on the premise that knowledge would grow by sharing advice and experience on how to make development projects more sustainable. A decision support system for making informed decisions on urban development was integrated with the system to address sustainability in a holistic manner. The BEQUEST toolkit hoped to bridge the various scales of urban development from whole urban regions down to buildings and their components and materials (Hamilton *et al.* 2002). The system was developed as prototype, but at the time of writing, this toolkit appears to be non-operational.

BREEAM and ECOHOMES

BRE (Building Research Establishment) launched its environmental assessment tool during 1990. BREEAM (BRE's Environmental Assessment Method) is used to assess the environmental impact of buildings. The application has been developed

specifically for housing under the name of Ecohomes. The assessment method aims to balance environmental performance with quality of life indicators. The issues assessed are grouped into seven categories: energy; water; pollution; materials; transport; ecology and land use; health and well-being. Following a formal assessment a building is rated on a scale of Pass, Good, Very Good or Excellent. The Housing Corporation is phasing in use of Ecohomes rating for all new social housing developments. By April 2006 all new development must achieve at least a 'Good' Ecohomes rating (Housing Corporation 2005a). The assessment has been well received but it focuses heavily on environmental issues and the output, in the form of a total score, is capable of masking parts of the development that are not sustainable.

SPeAR

SPeAR (Sustainability Project Appraisal Route) is a commercial tool developed by ARUP engineers. The model uses a graphical representation of sustainability for a project organised into a four quadrant diagram each representing indicators for environmental protection, social equity, economic viability and efficient use of natural resources. The model provides a visual profile of sustainability and is very useful way of representing indicators so that they are easily compared (Arup 2004). The indicators are built in to the model and make general sense of the broad definition of sustainability. However specific project objectives are not addressed within the model and its use is limited to commercial clients.

A Toolkit of Indicators of Sustainable Communities (Housing Corporation)

This set of indicators is now mandatory for all housing associations in England. (Long 2003). The nine factors are aimed at the wider context of community and the core factors of demand, reputation and crime reflect their broader application. Housing quality is built in to this set of indicators but not sufficiently to be useful for application in the procurement process. The indicators of current and future demand

for the housing are vital considerations to sustainability but relate to strategic decision making.

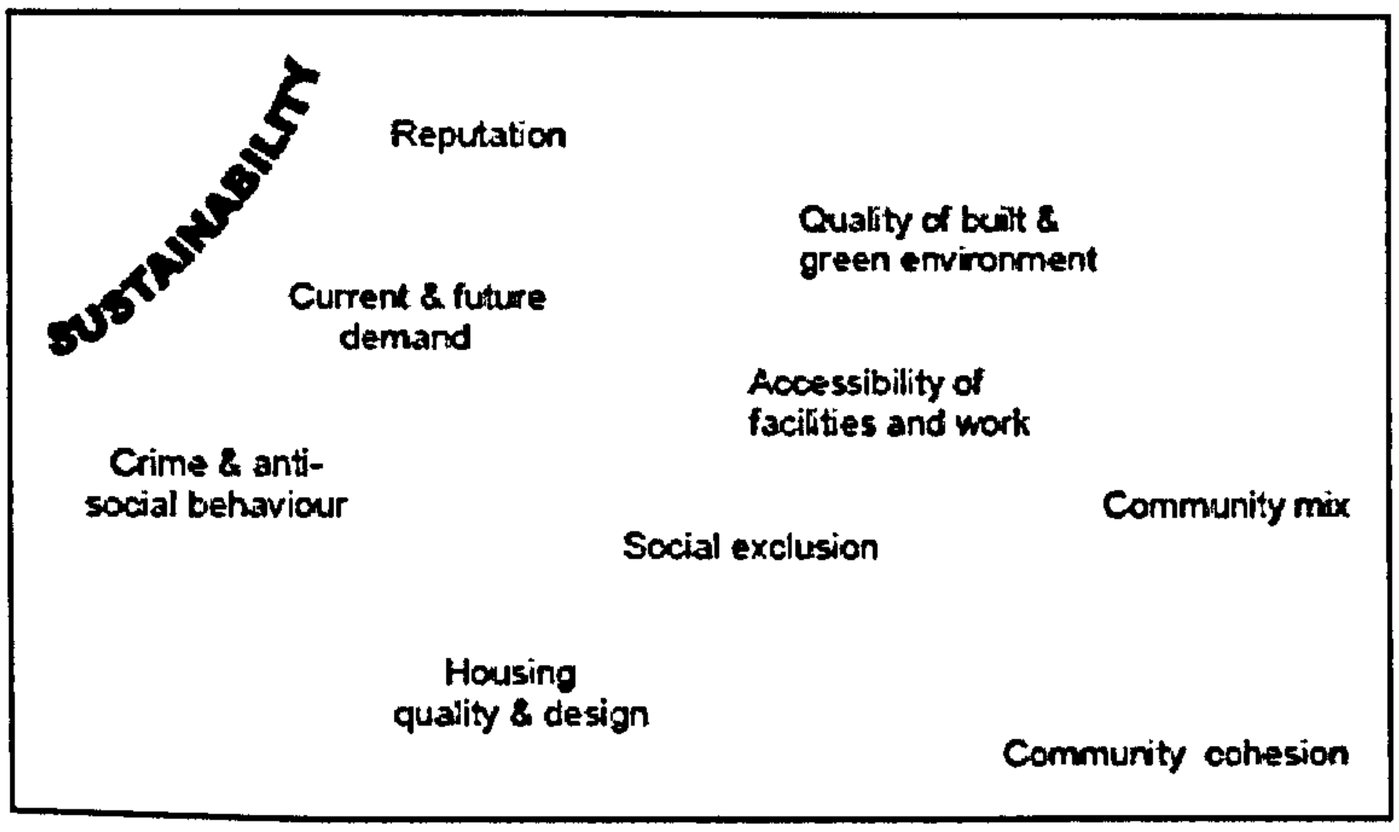


Figure 2-2: Factors of community sustainability (From Long 2003)

Sustainability Works

This resource, developed to support housing associations increase the sustainability of their developments, provides information on how to increase sustainability within a project. Sustainability Works makes use of web based technology and provides interactive tools for writing reports to fit in with the use of Ecohomes and various other initiatives used in the English social housing sector. The guidance is well presented and covers a broad range of issues - Adaptability; Durability; Accessibility; Low Environmental impact; Re-use and recyclability; Health and wellbeing; Procurement; Asset Management. The disadvantage of this resource is that it does not provide a specific framework for decision making. The large number of issues is liable to overwhelm a user or lead to a checklist mentality.

This range of toolkits is a small selection of the vast range available. Each has its merits, but on the whole they do not address the specific needs of an individual project. There is a need for a change in the way in which sustainability is evaluated for construction projects. A suitable framework which enables decision makers to

understand the implications of sustainability is needed (Lombardi and Brandon 2002).

2.2.7 Summary of Sustainable Development

Reviewing the literature, it is evident that the UK government is committed to the concept of sustainability and is involved in developing and evolving the strategy and policies that are key to shaping action on sustainable development. There is high level commitment to and integration of International policy on sustainable development.

The range of principles, toolkits, definitions and agendas relating to sustainability is overwhelming. The common theme of equiponderance towards economic, social and environmental aspects of sustainability manifests itself in many of them. The common failing of all the toolkits considered, is that they either are too broad – aimed at policy level thinking; or overly complex – detailing vast lists of actions appropriate to improving sustainability. The result is a lack of a structured framework to assist project teams involved in the procurement of a building project.

2.3 Procurement of Social Housing

At the World Summit in Johannesburg in 2002, the World Wildlife Fund (WWF) launched 'the one million sustainable homes' campaign to *bring sustainable homes from the fringes of the housing sector to the mainstream* (WWF 2004). This action conicided with increased public funding into the UK social housing sector and a high profile campaign to improve the sustainability of housing.

> *The Government is putting in the resources to make all social homes decent by 2010. Our sustained investment in social housing will have*

> *enabled local authorities and housing associations to spend around £42 billion on their existing stock by 2010.*
> (ODPM 2005: 9)

Massive investment has been allocated to improving the quality of social housing in the UK over the next five years. The money is to be delivered through the housing agencies, governmental organisations charged with the delivery of social housing. Housing is central to the successful delivery of sustainability. It affects quality of life and has implications beyond housing, affecting transport, health, employment and community (Stevenson and Williams 2000). The requirement to deliver sustainable development is met with a challenge to those involved in the procurement of social housing.

2.3.1 Social Housing and Sustainable Development

The housing agencies introduced sustainable development policies in response to the adoption of sustainability as an overarching theme by the UK government. Communities Scotland developed a policy in 2000 and the Housing Corporation followed suit in 2003. The concept is well embedded in policy and high level commitment is well publicised (Housing Corporation 2004). The *Delivering Sustainable Communities Summit* in Jan 2005 hosted by the ODPM and attended by the Prime Minister demonstrates the political importance of sustainability in the social housing sector. This event brought two thousand 'experts' together to debate how best to move forward the objective of making housing more sustainable.

Since 1998 the social housing sector has been inundated with advice and guidance on how to deliver sustainability. The Housing Corporation has supported twenty six Innovation and Good Practice (IGP) projects focused on sustainable development over the last year (Housing Corporation 2004). The Housing Forum has forty nine demonstration projects relating to sustainability, the majority of which are social housing projects. There is political and policy support to the goal of sustainable

development yet there is evidence that in general practice it is a concept that is still misunderstood and unsupported by many stakeholders in the procurement system (Sustainable Homes 2004:2; Harris and Holt 1999:207).

The *Sustainable Housing Design Guide for Scotland* (Stevenson and Williams 2000), the *Sustainability Policy Wizard* (Talbot 2002) and *Six Steps to sustainable development for housing associations* (Beyond Green 2004) provide the social housing sector a wealth of information and approaches to addressing sustainability. The disadvantage to these resources is that they present every possible opportunity to deliver a more sustainable housing project. It is an impossible task to incorporate all good practice into a single project and the housing associations are left with the difficult decision of adopting some measures and rejecting others.

Housing can contribute to sustainability by reducing climate change; reduce the need for physical resources; reduce pollution; creating sustainable communities (Stevenson and Williams 2000). The problem for the social housing sector is how to deliver it through the procurement system. There is a 'general lack of understanding as to what sustainable development means' (Blair and Evans 2004:14) and although the policy level commitment is well defined there is a need for a structured approach to integrating policy and practice through the procurement system.

2.3.2 Social Housing over the last sixty years

Social Housing is a term used to describe housing provided by Housing Associations (HAs) or Registered Social Landlords (RSLs) at an affordable rent. In the UK housing is high on the political agenda. There is a long history of government subsidised housing in the UK. King (2001) believes that subsidising landlords is the most effective way of getting houses built, while encouraging a better quality then might be the case in the open market.

Social housing has evolved over the last sixty years under various political, social and economic pressures. Following World War 2, there was a massive shortage of housing caused by a combination of war damage and a prolonged period with little or no housing construction. What was available was generally of a poor standard. Between 1945 and 1970 mass council house development was encouraged by subsidies provided by changes in housing policy. During this time there was a steep increase in the number of people living in council housing. By the end of the 1970s one third of UK households lived in council housing.

Subsidies can be seen to have influenced much housing activity over the last century. Slum clearances were encouraged through the Housing Repairs and Rents Act 1954 and the development of high rise building was rewarded in the 1956 Housing Act. A period of neglect during the 1980s resulted in a majority of council housing stock falling into a state of disrepair. More recently housing has shifted to the centre of the political spotlight and has received significant policy attention.

Government intervention has also overseen a decline in private rented accommodation from 89% of the housing stock in 1914 to just 11% in 2000. It is claimed that this was caused by the introduction of the 1915 Increase in Rent Act. This fixed rents at 1914 levels. Although it was intended as a form of control to assist in the provision of housing its net effect was the demise of the private rented sector. The decrease in this type of household has been balanced in part by an increase in owner occupation from 10% to 69% in the same period. The introduction of the right to buy policy by the Conservative government in the Housing Act 1980 was a device that kept the proportion of owner occupiers on the increase. 1.3 million council houses were sold to their tenants. While originally opposed by the Labour opposition it has now been accepted as policy albeit with reduced financial subsidy. Homeownership is by far the most popular choice of tenure in the UK (DETR

2000b). However, current trends in the UK domestic property have seen average increases of 60% in the value of homes over the last 30 years (Barker 2004). This has pushed the ideal of home ownership further away from an increasing percentage of the population. Low cost social housing provided by the state through the housing association movement is the only option for many households.

Housing Associations have been in existence for well over one hundred years. The Guinness Trust and Peabody Trust were formed in 1890 and 1862 respectively, with endowments from wealthy philanthropists. They have since operated as private limited companies or charities, carrying out a welfare role to the communities they serve. The Housing Act of 1974 enabled housing associations to receive grants to develop social housing. This saw the beginning of a shift from the development of social housing by councils to the housing association sector. By 2000 14% of the housing stock was owned and managed by housing associations (or RSLs). Although this had reduced to 10% of new housing by 2004 it is accompanied by a decline in local authority development to almost zero (Table 2.4).

Table 2-4: Percentage of homes completed by tenure in the UK (From ODPM 2004)

Financial Year	Completed (Number of dwellings)						All Dwellings
	Private Enterprise		RSL (Housing Associations)		Local Authorities		
1990/91	162,182	82%	19,342	10%	16,550	8.4%	**98,074**
1995/96	156,697	79%	38,471	19%	3,045	1.5%	**198,213**
2000/01	152,219	86%	23,850	14%	382	0.2%	**176,451**
2003/04	171,200	90%	18,345	10%	198	0.1%	**189,743**

Massive investment in the last year has seen a dramatic increase in the number of social housing completions. More than 32,000 new homes were constructed with Housing Corporation assistance between 2004 and 2005 with continued investment planned for the following year (ODPM 2005).

2.3.3 Social Housing Funding

Local authority funding of social housing has declined over the last twenty years and the housing agencies have become increasingly responsible for delivering financial aid to the delivery of social housing. This purposive centralisation of control for social housing finance sought to remove power from local authorities that had failed to deliver an adequate quality of housing. Private finance became evident in the social housing sector from 1990 and has increased steadily over the last fifteen years. The governments since then have consistently reduced public expenditure on housing which has increased the importance of private funding (King 2001).

Between 1974 and 1996, housing associations received subsidy in the form of Housing Association Grant (HAG). This was administered by the Housing Corporation in England and Wales and by Scottish Homes (now Communities Scotland) in Scotland. These government agencies regulate, fund and monitor the activities of Housing Associations. Prior to 1989 HAG was determined at the completion of the contract and hence could allow the construction costs to escalate without fear of penalty on the part of the HA. In the 1988 Housing Act, housing associations were defined as part of the *independent rented sector.* This aligned housing associations with private landlords and distanced the government from its role as provider of the majority of financial subsidy. The Act placed risk on the housing associations in that, deficit revenue subsidies were removed. Housing Associations were now liable for the financial risk of cost overruns on a development. This factor encouraged an increase in the use of design and build as a procurement route. (Goodchild and Chamberlain 1999).

Social Housing Grant (SHG) replaced HAG in 1996. Housing Associations make an annual bid for development funds. The Housing Corporation and Communities Scotland administer funding to social housing projects. The transfer of funding allocation from the housing agencies to local authorities took place in 2004. Each

region has a single budget for housing investment. This will be allocated to each to meet the priorities identified in the Regional Housing Strategy. (DTI 2004) Although private finance is now an essential part of social housing development, without these subsidies very few housing associations would be able to develop housing projects. The amount of grant funding is approximately fifty percent of the capital finance in a project. The remaining funds must be raised through private finance. The funding mechanisms for social housing exert pressure on the procurement system. Commercial and political factors both influence the procurement system. Financial pressures influence the allocation of the budget across a project. The current funding regime prevents housing agencies applying for additional funds in the case of cost overruns. In order to secure housing agency development grant, a housing association must demonstrate that the proposed housing is 'sustainable'. The financial pressures impact on the ability of a project to address sustainability.

The Housing Corporation has introduced two routes for funding bids. Housing associations apply for grant assistance on a partnered approach or a traditional approach to procurement. 80% of the development grant has been allocated to 70 partner associations for the next two years (ODPM 2005). This indicates a commitment to the use of partnering in the development of social housing.

2.3.4 Social Housing Procurement

There has been significant impact on social housing since the publication of *Rethinking Construction* (Egan 1998). This report identified opportunities to improve the efficiency and quality of delivery of UK construction. The Housing Forum was created the same year to implement the Egan principles in the housing sector. Social housing was targeted as an area best able to deliver improvement in respect of the efficiency gains. The approach to procurement used at the time was perceived to lower the quality of the housing and major change was needed.

Procurement in the context of development refers to the approach used by a group of stakeholders to plan, design and construct a housing project. It can be described as the mechanisms used to realise a project (National Housing Federation 2001). Housing Associations can be seen to use a variety of procurement options to produce housing. Traditional and Design and Build are the most common forms of social housing procurement across the UK. The introduction of the "best value" principles with the 1988 Housing Act saw an increase in the use of Design and Build (Griffiths 1999). And more recently a partnered approach to procurement is actively being promoted from the housing agencies through funding controls.

Traditional contracting was the used throughout the housing association sector for Because of the separation of the design and construction processes in traditional contracting, the contractor is not involved until the design and construction drawings are produced. This limits input by the contractor, and removes incentive to make cost savings or innovate in the construction process. The housing association retains control over the design of the housing and can achieve cost certainty on the agreed scheme, but bears the risk of cost overruns from any changes or unforeseen circumstance. Until 1988 housing associations were cushioned by the existence of deficit funding. This provided additional grant funding for schemes that had exceeded their original cost estimates (King 2001). This reduced the need to pass on risk to the contractor. The contractor is selected by competitive tender.

Design and Build involves some or all of the design being undertaken by the contractor. This form of contracting is often adopted to deliver projects earlier than might be the case with traditional contracting. The housing association benefits from cost certainty on a project, but loses control over the design beyond setting initial client requirements. This approach emerged for housing associations in the 1980s. Two thirds of new build schemes were procured by design and build by the mid

1990s in England and this form of procurement has become increasingly popular in Scotland. Design and build became especially significant with the removal of deficit funding in the 1988 Housing Act. The element of cost certainty seems to have attracted more housing associations to its use in procurement of new housing.

Goodchild and Beatty (2000) examined the procurement practices of Scottish housing associations. A study of procurement methods carried out between 1993 and 1997 revealed that 57% of all new bedspaces were procured using traditional contracting, while 37% employed design and build. The remaining 6% were purchased as complete buildings. The emphasis on traditional contracting may be explained by specific endorsement of this approach in the *Procurement and Practice Guide* (Scottish Homes 1990).

Partnering was identified within *Rethinking Construction* (Egan 1998) as a means to deliver efficiency gains through the procurement process. The housing agencies in Scotland and England have integrated partnering into their development programmes. *Building a Better Deal* (Communities Scotland 2002) recommends that partnering is considered for all medium or large capital works. Housing associations in England have been able to apply for development funding through a 'partnered approach' since 2004. There are no up to date figures on the number of projects being procured through a partnering arrangement. Anecdotal evidence suggest that there is an increase in the use of partnering across the social housing sector. Demonstration projects illustrate the successes of using partnering (Housing Forum 2004) and there is a belief that partnering can bring efficiencies especially when using innovative forms of construction (Garrand 2001).

2.4 Partnering

Partnering is an approach to procurement. Its use is increasingly being heralded as an effective way to bring sustainability to the heart of building project procurement. One of the aims of this research is to establish if partnering is a better way to deliver a construction project in order to achieve the benefits of sustainable development. This section reviews the context of partnering in the construction industry and the perceived benefits of its use. The applicability of partnering in the social housing sector is considered and the potential link between partnered procurement and sustainability is explored. The potential benefits of partnering and its link with sustainability form one of the lines of enquiry in the second phase of research. This part of the literature forms the background to this part of the study. This section of the literature review is structured to provide a background definition of partnering and its applicability to social housing; the benefits of partnering; a brief exploration of the cultural aspects of partnering.

2.4.1 Background

Partnering emerged in the UK construction industry at the beginning of the 1990s, and because of the relatively young nature of the concept there is not a large body of empirical research. The UK construction industry with its reputation of adversarial culture has cautiously welcomed the idea of partnering. There are many case studies of successful partnering yet it remains a minority procurement route. A survey of contracting practices carried out on behalf of the RICS in 1998 revealed that only 1.7% of projects was carried out under partnering agreements. Partnering and collaborative working are not sufficiently evolved and researched to be able to draw lessons from past experience. Much of the evidence presented in research papers is anecdotal or based on a small sample. There has been insufficient examination of the quantitative effects of partnering to understand if the efficiency gains and benefits are possibilities for the entire construction sector.

Partnering is advocated by the Housing Forum and the UK housing agencies as a means to deliver improvement through the procurement of social housing. The main aim of partnering is to bring a team together with a shared goal of completing a project to the mutual benefit and satisfaction of all those involved (ECI 1997). Following publication of *Constructing the Team* (Latham 1994) partnering was encouraged in public sector procurement, in the belief that huge improvements to the performance of the construction sector might be achieved.

A report on the implementation of Rethinking Construction in the Scottish social housing sector identified a need for funding mechanisms to encourage collaborative working, including partnering (Davis Langdon Consultancy 2002). The study characterised seven levels of collaborative working. *Competitive tendering* at level one and; *total integration* at level seven. While there was a willingness on the part of contractors to move from traditional contracting to partnered procurement, the housing associations expressed some reticence. However an earlier report on innovation in procurement of Scottish social housing (Garrand 2001) reported RSLs involved in partnered procurement were enthusiastic about its ability to deliver benefit and see it as a means to provide best value.

2.4.2 What is partnering?

The interpretation of partnering takes two forms. One, a philosophical position or framework. Two, a means of implementing a contract. There is a difficulty in finding absolute agreement at a detailed level as to what partnering is and hence it may be applied to various forms of alliancing (Liu and Fellows 2001). Masterman (2002) defines four categories of procurement: separated; integrated; management-orientated and discretionary. Partnering is classified as a discretionary system, and is described as :

> *a means of administering and establishing an environment within which a project is implemented using any of the available procurement systems to carry out the funding, design, construction etc. of the project, although some systems work better with partnering than others.* (Masterman 2002:135)

This implies that it is not a form of procurement but a framework within which procurement takes place. This view is supported by the numerous definitions of partnering found throughout the literature. The CIB (1998) definition refers to a *management approach*. Bennett and Jayes (1995:2) define partnering as *a better way of working*. ECI (1997:1) claim that partnering is *both an attitude of mind and a series of procedures*. Barlow *et al.* (1997) state that partnering is *essentially a process by which organisations develop more collaborative relationships*. The common theme is that partnering is not a new way of contracting but a fresh approach to doing business.

There are two types of partnering. Project partnering where the relationship is put in place for one specific project and; Strategic partnering where there is a long term/ multi project arrangement. It tends to be stated that there is more benefit to be gained from strategic partnering, but an acceptance that project partnering is most likely to be embarked upon by those new to the concept.

Some literature emphasises the processes that define partnering and consider it more of a contractual arrangement (Bennett and Jayes 1995, Matthews 1999). CIB (1997) describes partnering as a *structured methodology for organisations to set up mutually advantageous commercial arrangements*. It also states that partnering is NOT a new form of construction contract. ECI (2000) presents a prescriptive approach to partnering in the social housing sector that can be used as a checklist of actions. The key objectives of partnering for social housing are identified as *cutting*

out waste, increased predictability, secure life-cycle cost benefits and increase innovation. Although culture change and philosophical position are mentioned within these texts, the emphasis is on the processes for achieving partnering.

Although the emphasis varies, there is recognition in most of the literature that both philosophical and process definitions are relevant and constitute an important aspect of partnering.

There is consensus in the literature on the attributes of successful partnering. They include trust, mutual objectives, collaboration, equality and agreed problem resolution. Bennett and Jayes' (1995) model of partnering encompasses three essential features; mutual objectives, problem resolution and continuous improvement (Figure 2.1).

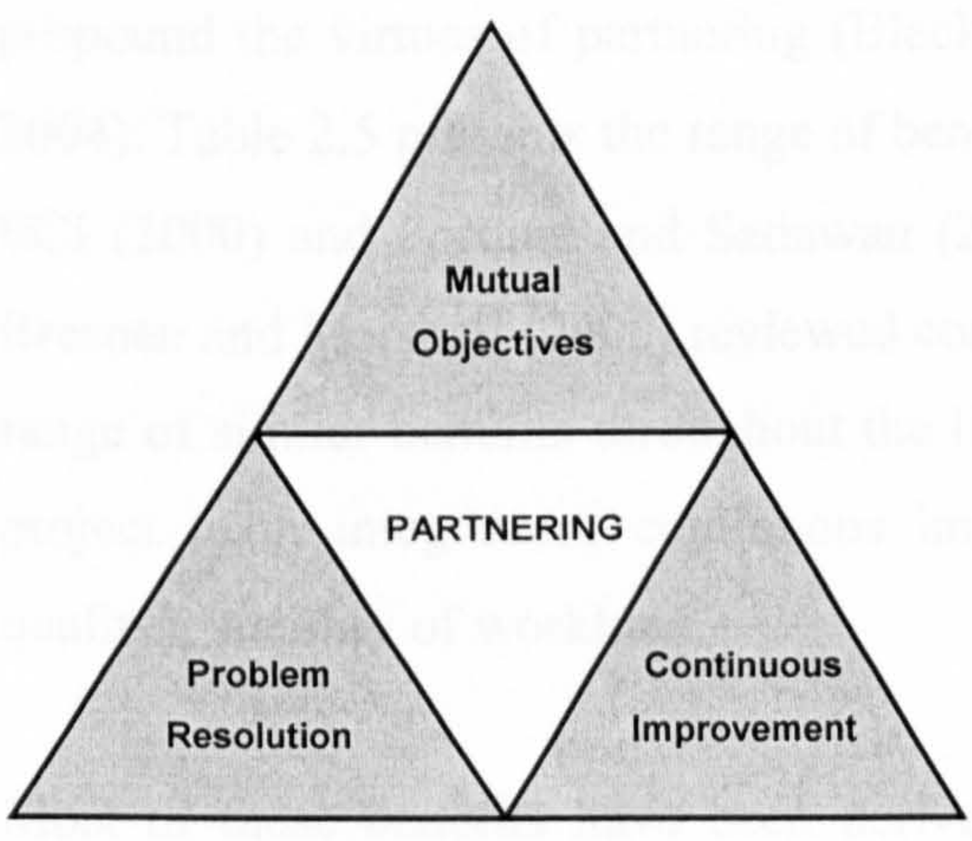


Figure 2-3: The three essential features of partnering (from Bennet and Jayes 1995)

Mutual objectives are considered the most important of these three. By establishing mutual objectives there is an understanding that the individuals best interest will be served by the overall success of the project. This focuses attention on the success of the project as a whole, rather than the narrow self serving culture of traditional contracting. The process of agreeing mutual objectives can be difficult, due to the

potentially conflicting nature of those involved in the procurement process. Clients, contractors and consultants may have vastly different opinions on what constitutes success in a project. A client often has long term interests in a project, while a contractor may only have a short term commitment to the objectives of a project. For partnering to be adopted as a preferred form of procurement the benefits must be realised.

2.4.3 Perceived Benefits

Bennett and Jayes (1995) made the claim that cost savings of 2-10% are achievable with project partnering and that strategic partnering may bring savings of 30% over time. The authors elaborated on the benefits of partnering in a later publication and suggested that cost savings of 50% may be achievable with *third generation partnering* (Bennet and Jayes 1998). Little empirical evidence has emerged to support this claim (Bresnen and Marshall 2000) but the literature continues to propound the virtues of partnering (Black et al. 2000; Rahman and Kumaraswamy 2004). Table 2.5 presents the range of benefits believed by Bennet and Jayes (1995); ECI (2000) and Fortune and Setiawan (2005) to stem from the use of partnering. Bresnen and Marshall (2000) reviewed construction partnering literature and found a range of similar benefits throughout the literature – financial savings; time savings; project team integration; continuous improvement; client satisfaction (improved quality); stability of workload.

Most of these benefits have been derived from anecdotal evidence supported by general agreement throughout the academic community. It is unclear if they are being realised through the procurement of buildings in any significant way. Many of these benefits are not directly related to the procurement process itself but more abstractly to the efficiencies and improvements that are achieved by the use of partnering (ECI 2000). The subjectivity of these issues perhaps explains the dearth of empirical evidence.

Table 2-5: Benefits of Partnering

Bennet and Jayes 1995	ECI (Social Housing) 2000	Fortune and Setiawan 2004
Customer focus	Identifies objectives	Long term cost savings
Quality	Certainty in cost / time	Improved quality
Efficiency	Reduces litigation	Improved work environments
Speed	Empowerment	Improved relationships
Responsiveness	Openess	Increased productivity
Team spirit	Information sharing	Improved life-cycle cash flow
Design	Team working	Improved planning for future work
Innovation	Problem solving	
Reduction in claims and litigation	Involvement of others	
Safety		
Continuous improvement		

Black *et al.* (2000) studied a group of contractors and consultants from the UK construction industry and their belief was that 'Partnering brings tangible benefits'. The benefits are not identified, although the contractors agreed with this statement more than the consultants, which could mean that the benefits are more aligned with the procurement process than the product itself. Three recent empirical studies attempted to identify the benefits that stakeholders in the procurement process believe are attributed to partnering. One study identified 'Mutual trust' and 'Open communications' and 'Understanding objectives' as the most important factors (Rahman and Kumaraswamy 2004). Cheng and Li (2002) cited 'Top management support'; 'Open Communication'; and 'Mutual trust' as the three top factors perceived to deliver benefits. Fortune and Setawani (2005) focused their study in the social housing sector. 'Predicticability' in time and cost was perceived as the most significant benefit of partnering. 'Improved quality' emerged from the study as the key benefit from long term partnering arrangements. Fortune and Setawani's study provides useful empirical data on procurement processes, but fails to acknowledge

the cultural and organisational issues that predominate the literature. The other two studies strongly identified cultural factors.

The underpinning philosophy of partnering is one of trust and common goals. These attributes are essential to allow partnering to add value and make the procurement process a success. Barlow *et al.* (1997) suggest culture is a significant barrier to implementing partnering. A survey of construction professionals confirmed this position. "Failure to build a trusting relationship" was muted by a third of respondents as a barrier to partnering (Murray *et al.* 1999*)*. Culture change is necessary to move away from the entrenched exploitive and adversarial ways found throughout the construction sector (Fisher and Stuart 2001) to a more collaborative way of operating.

Organisational research has emerged over the last five years in response to the new procurement systems emerging out of partnering (Holt *et al.* 2000; Cheng and Li 2002; Pryke 2004). This body of research reflects the growing importance of trust, communication and relationships between organisations involved in some form of partnering. It represents a departure from a focus on the processes of partnering towards a cultural shift. Liu and Fellows (2001) suggest that an eastern perspective is useful in the cultivation of trust and harmony necessary to partnering success. They introduce a concept based on the teachings of Confucius termed 'self cultivation'. This concept determines that trust is only gained through some form of sacrifice for others and mutual benefit is then gained as a result of the synergistic whole and a process of learning (Figure 2.4)

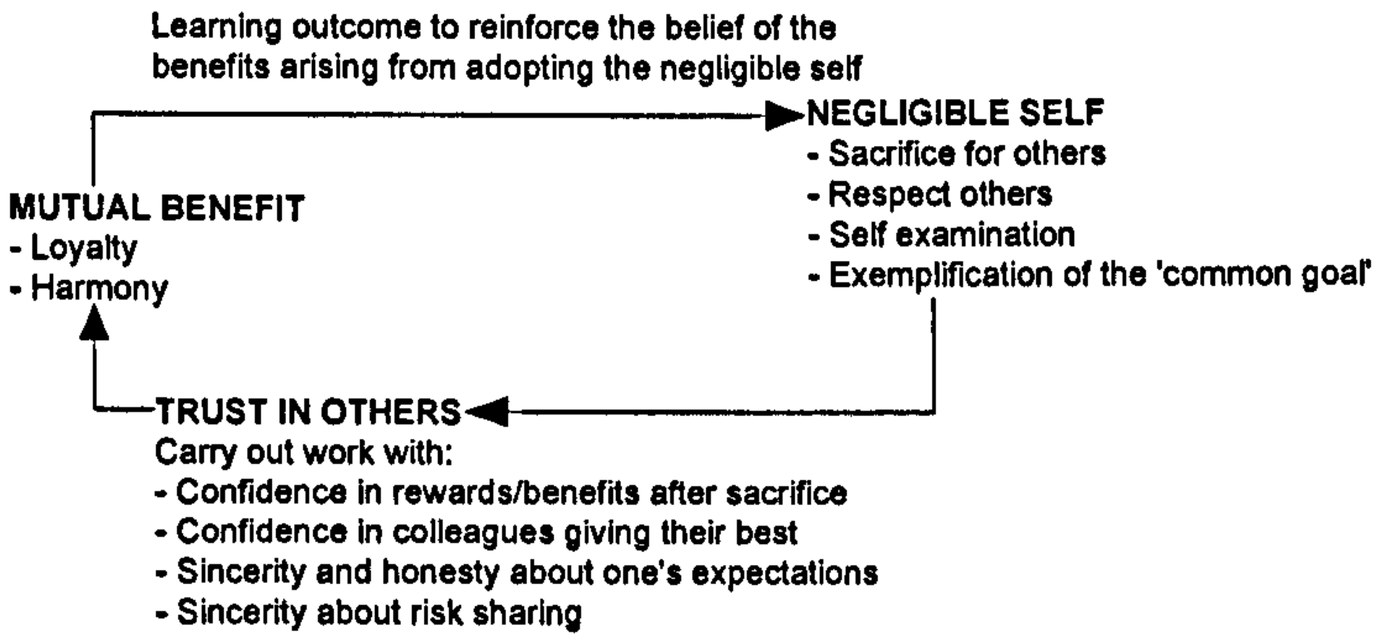


Figure 2-4: Partnering model (from Fellow and Lui 2001)

The distinctly philosophical background to this concept is unlikely to gain favour in a business sense. The cultural shift is perhaps too large. However the concept has merits in interpreting a link between partnering and the delivery of sustainability. There is a congruence between the eastern perspective of partnering and the concept of sustainability based on the ideal of self cultivation. It provides an environment in which the important aspects of sustainability can be cultivated– mutual goals, long term thinking and sacrifice.

2.4.4 Linking Partnering and Sustainability

The Rethinking Construction report, *Accelerating Change* (Strategic Forum for Construction 2002) states that *every link of the supply chain has a critical contribution to make towards sustainable construction and development.* This direct relationship between sustainability and some form of project team integration is an important recognition of benefit that partnering has to the delivery of sustainable development. Agenda 21 (UN 1992) acknowledges that it is important to overcome confrontation and to foster a climate of genuine cooperation and solidarity to make sustainability a reality.

Partnering and Sustainability share some key attributes. They are both concerned with **cultural change; mutual goals; and long term objectives.** The cultural

change involved in integrating sustainability or partnering into existing organisations is often cited as a barrier to implementation. Rwelamila *et al.* (2000) found that traditional procurement systems were incapable of dealing with sustainability parameter. The lack of focus on sustainable construction was primarily due to an inappropriate project organisational structure. Mutual goals and long term objectives common to both concepts suggest that partnering may be a framework for realising sustainability within a project. The 'negligible self' developed in the model of partnering from an Eastern perspective (Figure 2.4) represents this commonality most clearly.

2.5 Summary of findings

The literature reviewed in the three areas of sustainable development; social housing procurement; and partnering provided the contextual background of this thesis. The literature was addressed with a view to identifying where the three areas of interest presented a degree of congruence. The most significant findings are concerned with the interaction found between the separate topics. Figure 2.5 represents the relationships that exist between global sustainability and the procurement of a housing project in the social sector. The relationships are all affected by filters that have an impact on the way in which the relationship manifests itself. The understanding of sustainable development in the social housing sector is filtered through the UK interpretation. The construction industry has been guided through the principles set out in Rethinking Construction (Egan 1998). This has resulted in a comprehension of sustainable development that differs significantly to the social housing sector. The way in which sustainable development is realised in a housing project is subject to the 'filters' of procurement approach and the way in which the sustainable development policy has been interpreted.

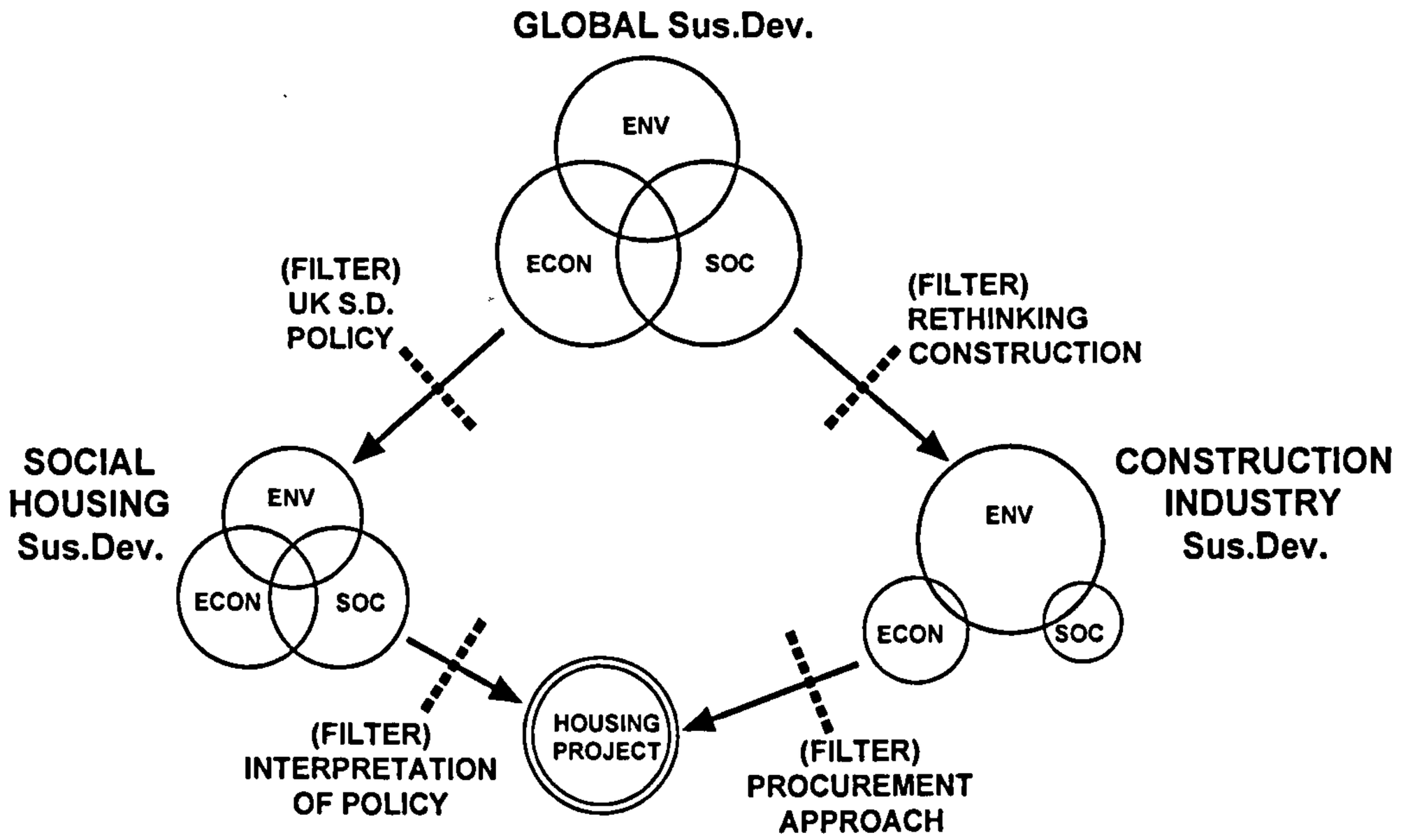


Figure 2-5: Map of literature following review

Sustainable development has evolved from an environmental bias to a much broader definition that incorporates social and economic aspects. This is apparent in policy rhetoric, adopting a top down approach emanating from the United Nations activity on Sustainability. The construction industry has developed an environmental bias to its understanding of sustainability. This position has an effect on the way in which sustainability is delivered in a project.

A wide range of sustainability toolkits and indicators are available. ECOHOMES ® is being used in the social housing sector for assessing the environmental impact of new housing development. The Scottish and English housing agencies are utilising web-based applications to assist housing associations develop sustainable development policies. The range of support, resources and policy advice the housing associations receive on sustainable development is vast. Yet there is not a clear definition of sustainable development at project procurement level. There is a need for a decision support framework to define and prioritise what sustainable

development means in a housing project. Without this, policy and practice remain on separate levels and real progress will be difficult to achieve.

2.6 Reflections on the literature review

The task of reviewing the literature has provided not only a wealth of information and source of analytical debate, but a concentrated education in how to deal with a continuously evolving topic. At the outset of this PhD study, the research area had already been defined in a funding bid to the RICS Foundation. This had some benefits for a new researcher, with a very basic understanding of the doctoral process. In commencing the literature search there was not a sense of taking a step off the edge into the unknown. While the proposal was not intended to constrain the research direction, it provided some useful signposts. On reflection this afforded a degree of comfort in the first few months of searching the literature. Gaining confidence meant that the original research proposal was given less importance. This gave freedom to the direction the literature research search and allowed a revised proposal to emerge.

It became apparent that the task of reviewing the literature was immense. To fully understand the complexity that characterised the topic, it was necessary to go beyond the limits of the construction based research on sustainable development. This increased the scope of the task and the volume of literature to be reviewed many fold. On a number of occasions when completely overwhelmed by the task, it was necessary to stand back and take stock of the relevance of the extensive references to hand. Retrospectively this 'journey' has proved rewarding and necessary to move the understanding of sustainability beyond the narrow confines of the construction context. The literature on social housing procurement and partnering provided a sense of grounding. They pulled the research focus back to the

context of the PhD study and provided a sense of achievability that had wavered slightly while exploring the complexity of sustainability.

Presenting papers at five international conferences at key stages during the PhD (see Appendix D), has provided an opportunity to discuss this research with fellow construction management researchers and consider other research that is underway in the same area. Sustainability has been a prominent theme at all of these conferences and it is clear that this research is at the forefront of the advancing field of sustainable development. There is enthusiasm and encouragement to take this research forward.

A process of cataloguing was adopted to organise the literature as it was researched. A database was used to stored typical reference information (author, date, title, publisher, etc.) and important quotes as a reminder of key points raised in the text. Copies of papers were stored in files arranged by subject areas. This approach has worked reasonably well when writing the literature review. It has been simple to refer back to the range of work that constitutes the core of the topic. Bibliographic software like Endnote ©, not available for this thesis, would have saved a lot of time in organising references throughout the thesis during writing up. This software will hopefully be available for future work.

During 2001 at the outset of this PhD research, the social housing sector was immersed in the sustainable development agenda and this has provided a rich source of empirical data and policy development adding to the contextual background of the research. It has been easy to become immersed in each topic and build up a rich contextual understanding of the research background from the reading.

Chapter 3 Research Methodology

3.1 Introduction

This chapter presents a justification of the research approach for this thesis which has led to the adoption of the research methodology used for this study. The chapter begins with an overview of the research paradigms adopted in construction management research and presents the evolution of approaches adopted for other research in sustainability. The debate on research methodologies that occurred during the 1990s amongst prominent researchers in the construction management academic community is discussed to assess the impact that this has had on the theories advocated in construction focused research. This provides the background to the development of a methodological approach for the research conducted within this thesis. The remainder of the chapter presents the research approaches adopted for each part of the research that has been conducted.

3.2 Construction Management Research

Research in the construction industry has a relatively short history. It has evolved from a concentration on "site operations" in the 1960s to a current involvement in "business operations and human systems" (McCaffer and Edum-Fotwe 1999). This evolution has been synonymous with the transformation in the way that the construction industry operates. The research agenda in construction management has widened its scope to reflect the needs of industry and in turn has driven change within the industry. Figure 3.1 illustrates the shift in focus of research and the increasing complexity of the research agenda. Each subsequent period of development has seen a further layer of complexity of research under consideration.

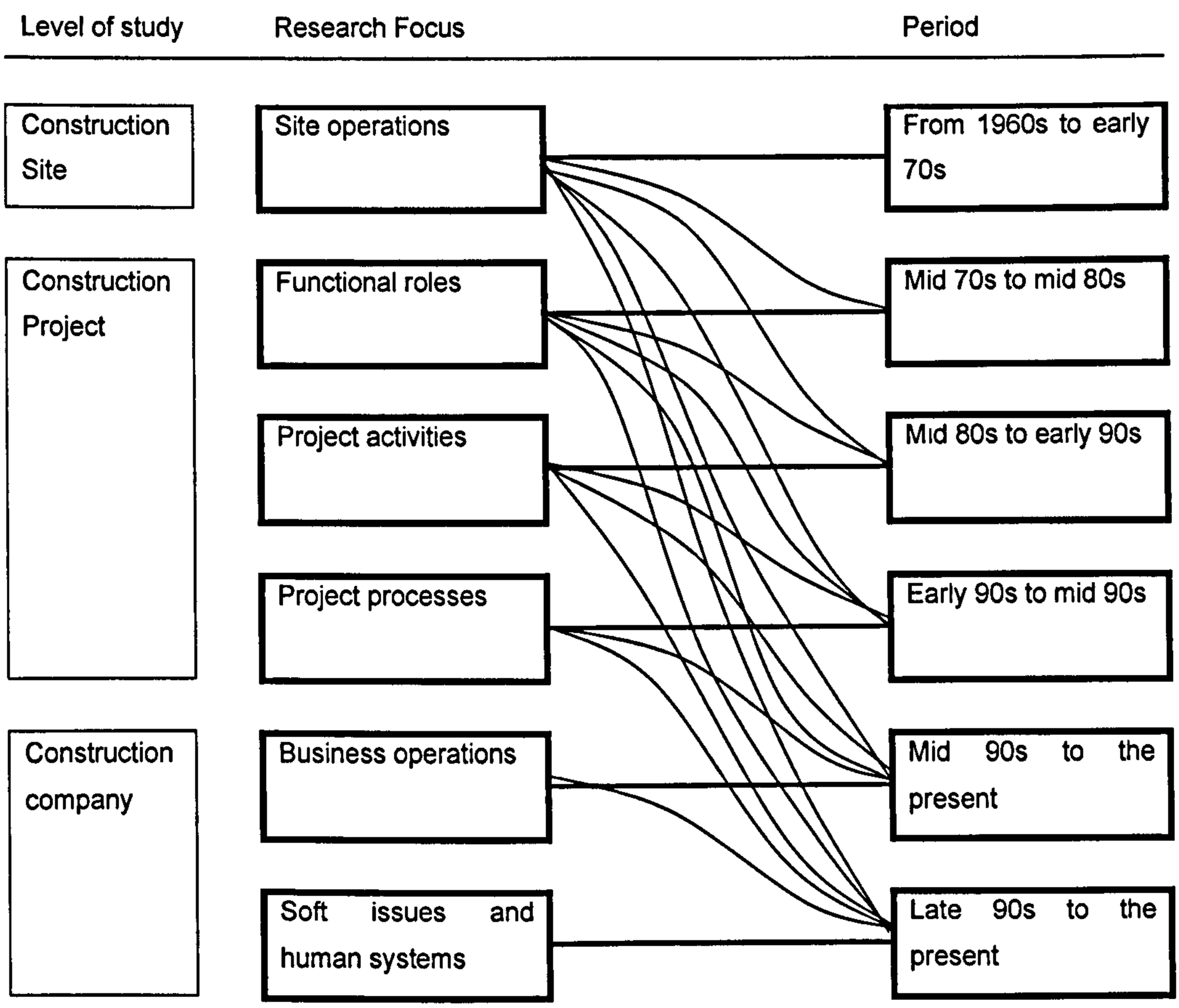


Figure 3-1:Evolution of research themes in CM (from McCaffer and Edum-Fotwe 1999)

In the 1960s and early 1970s research focused on the measurement of site activities in an attempt to improve the efficiency of the construction process. The study of construction organisations was not often considered by researchers at this time. Improvements made in operational performance on site identified the need for better integration of individual site operations. Throughout the 1970s and early 1980s estimating and planning techniques were considered the means to improvement within the construction industry. This marked a change in focus within the research community from site based studies to project level research.

During the 1980s the systems that had developed during the previous decade were tested in the real world. There was a clear divergence between the theoretical models and the complexities found within the construction industry. The IT revolution of the mid 1980s saw the development of a multitude of construction specific software. This kept the emphasis of research on the construction process (McCaffer and Edum-Fotwe 1999). The 1990s saw a widening in the perspective of the research community. Rapid and fundamental change in the industry on technological and cultural levels changed the requirements of research. There was recognition that construction research needed a different approach if it was going to address the difficulties of the industry highlighted in the Latham report (Edum Fotwe *et al.* 1996). Construction management research has evolved rapidly throughout the last ten years. A holistic approach was adopted first of all to the study of the construction project and then to the construction organisation within the overall business community. Hard and soft issues have been considered and the social sciences have had a significant impact on the approach that researchers adopt. There has been a tendency for research to be removed from the actual practice of construction and the results of research in the form of knowledge has not been disseminated to the industrial sector. McCaffer and Edum-Fotwe (1999) call for greater integration between the research community and industry.

The research tradition underpinning the majority of research in construction management for its first four decades is based on a quantitative approach from a rationalist or scientific paradigm. This is often attributed to the origins of construction management research lying in the engineering discipline [Edum-Fotwe *et al.* 1996, Seymour and Rooke 1995]

A predominance of quantitative methodology still exists in construction management research with the emphasis on the scientific methods of data collection and analysis. A study of abstracts published in the Construction Management and Economics journal from 1983-1996, revealed that 57% of the research uses a

quantitative methodological approach. Only 8% were based on qualitative research and 13% used a mixed methodology. The remaining papers were classified as "non-research" papers (Loosemore *et al.* 1996).

In 1993 a review of the first ten years of Construction Management and Economics (CME) was conducted (Betts and Lansley 1993). It was aimed specifically at establishing trends in research content and contributing to the debate about the development and maturity of construction management research in general. The majority of research carried out within the first ten years of CME was found to be empirical research. The research papers were found to focus on the construction process and production aspects of construction. Only occasionally were human aspects dealt with. 70% of the papers were written using original, largely empirical data. This was thought to be consistent with a young discipline, building a foundation of knowledge. The underlying basis for research was firmly rooted in the scientific community, with building and civil engineering making the largest contribution. The review classifies the type of research within CME as "using conventional research methods", which suggests a rationalist approach. It was observed that the research did not make a large contribution to the development of theory and concluded that the discipline was "in its early stages of evolution" (Betts and Lansley 1993:243). This claim produced a strong response in its call for debate.

Papers discussing research approaches were published in Construction Management and Economics, Engineering Construction and Management and the Journal of Construction Procurement in the period 1993 - 1998, revealing a wide range of opinions. Seymour and Rooke (1995) rebuked the systematic use of the rationalist paradigm within construction management research, claiming that it was not a valid approach for investigating a management activity that constituted a wide degree of human subjectivity. They went on to propose an interpretative approach as a way to better understand the social processes present in construction management practice (Seymour and Rooke 1995). It was argued that the data collected in the name of

scientific research has often been subjected to an interpretative process by the researcher prior to formal analysis and therefore could not be claimed to be pure objective measurement. (Seymour *et al.* 1997).

This strong "anti-scientific" (Runeson 1997:299) attack on construction management research attracted an equally strong response. Runeson defended the scientific paradigm vehemently stating that it is "the best insurance against bad research". He argued that positivism reduced subjectivity and was essential to define causal relationships to allow testing or development of theories. This, he argued was the basis of scientific progress. (Runeson 1997).

An alternative view on research approaches was published at this time by Raftery *et al.* (1997), making the case for the use of mixed methodologies. They congratulated Seymour and Rooke for stimulating the debate, but were concerned that a "stark intellectual landscape" would be created by the positioning of research at the two extremes of "rationalism and interpretativism". They suggested that Seymour and Rooke had adopted this position as a catalyst to change within the research community, but argued that deeper discussion on appropriate methods to solve problems was needed. It is further argued that qualitative and quantitative research methods are not mutually exclusive, and that they can and should be combined in order to tackle the diversity of construction research (Raftery et al. 1997).

The debate that ensued effectively polarised into a quantitative versus qualitative argument (Root *et al.* 1997). It incorporated the strong defence and rejection of research approaches from the two ends of the spectrum (Table 3.1). The proponents of a mixed mode of research suggested a synthesis of these positions by adopting a research methodology that incorporated quantitative and qualitative approaches. The belief was that verification and triangulation of the research could be attained. Table 3.1 illustrates the even spread of views held by the participants. The key papers that constituted the debate express deeply held views on the research methodologies that

are appropriate to construction management. The debate lasted for five years. It included a limited number of key players, entrenched in their views on the subject. Those involved in the debate sought to increase understanding in research approaches and ensure that research was carried out in an appropriate way. However, the debate indicated a divergence of opinion.

An 'Interpretive' approach to research essentially aims to discover meanings made by 'social actors'. The data is most commonly in the form of words and sees human activity as a collection of symbols expressing layers of meaning (Miles and Huberman 1994). It differs from a 'Positive' approach that is based on the scientific quantitative approach to research common in the natural sciences.

Table 3-1: The Research Debate in Construction Management (1993-1998)

Date Published	Publication	Title	Author/s	Perspective
1993	CME	Construction Management and Economics: A review of the first ten years	Betts and Lansley	Review
1994	CME	Re-engineering construction: a new management research agenda	Betts and Wood-Harper	Interpretive
1995	JPR	Comment: Relevant research and quality research: the researcher's role in the property market	Lizieri	Multi-paradigm
1995	ECAM	The NEC and the culture of the industry: Some early findings regarding possible sources of resistance to change	Rooke and Seymour	Interpretive
1995	CME	The culture of the industry and the culture of research	Seymour and Rooke	Interpretive
1996	ARCOM	Innovation and courage in construction management research	Loosemore, Hall and Dainty	Multi-paradigm
1996	ARCOM	Research methods versus methodology: achieving quality in scholarly research for construction management	Edum-Fotwe, Price and Thorpe	Review
1997	CME	The role of theory in construction management: a call for debate	Seymour, Crook and Rooke	Interpretive

1997	CME	Breaking up methodological monopolies: a multi-paradigm approach to construction management research	Raftery, McGeorge and Walters	Multi-paradigm.
1997	CME	The role of theory in construction management research: comment	Runeson	Positivist
1997	CME	Rigour in research and peer review	Fenn	Positivist
1997	CME	Preserving Methodological consistency: a reply to Raftery, McGeorge and Walters	Rooke, Seymour and Crook	Interpretive
1997	JCP	The methodology of building economic research	Runeson	Positivist
1997	JCP	Designing a research methodology	Lenard, Raftery and McGeorge	Multi-paradigm.
1997	JCP	Quantitative versus qualitative or positivism and interactionism	Root, Fellows and Hancock	Multi-paradigm.
1997	JCP	Developing a more empirical approach to culture, attitude and motivation in construction management research	Rooke	Interpretive
1997	JCP	Empirical enquiry or metaphysics? Respecifying the Methodological debate	Crook	Interpretive
1997	JCP	Ignorantes Procedite: A critical evaluation of the movement for methodological renewal	Runeson	Positivist
1998	JCP	Construction Management research and the attempt to build a social science	Seymour and Rooke	Interpretive
1998	ECAM	The methodological challenges posed by the confrontational nature of the construction industry	Loosemore	Multi-paradigm
1998	CME	The baby and the bathwater: research methods in construction management	Wing, Raftery and Walker	Multi-paradigm.
1998	CME	The role of theory in construction management; reply to Runeson	Seymour, Crook and Rooke	Interpretive
1998	CME	Why research without theory is not research A reply to Seymour, Crook and Rooke	Harriss	Positivist
1998	CME	Rigour in research and peer review: a reply	Alkass, Mazerolle and Harris	Positivist
1998	CME	From Ptomely to Heisenberg: quantitative models and reality	Raftery	Interpretive

The debate sought to explore and alter the way that researchers addressed their work. Prior to the debate the majority of research work was based on a rationalistic approach using a quantitative research methodology. Following the debate qualitative research became far more common and as the techniques associated with qualitative research have become more familiar their use has increased. The trend for construction research to consider the softer issues of construction management has necessitated the use of softer research techniques. This is apparent in the divergence of research methodologies emerging in the last three years. Many of those involved believed that change was necessary to enable rigorous research. A study of published research since 1998 has sought to investigate the impact that this debate has had on the construction management research community. A review of the ARCOM proceedings of the subsequent three years has identified methodological approaches currently adopted by researchers in the field (Table 1.2).

Table 3-2 Review of Research Approaches in CME 1983-96 (from Loosemore *et al.* 1996) and ARCOM proceedings 1999-2001

	Quantitative	Qualitative	Mixed	Review
1983-96	57	8	13	22
1999	39	7	12	42
2000	29	6	20	45
2001	28	19	15	38
Figures in %				

Three text books on research methods in the built environment were published in the wake of the debate [Fellows and Lui (1997), Holt (1997), Naoum (1998)]. These were the first texts to specifically address research in the construction sector. It would seem logical to assume that they have been prompted in some way by the culture change associated with the debate in methodological approaches. They all deal with quantitative and qualitative methods, but only touch briefly on the fundamental approach to research in terms of philosophical position. Holt (1997) has a balanced although brief view on "Conceptual/Empirical" approaches and refers his

readers to more detailed texts on research methodology. Fellows and Lui (1997) commence with a broad overview of research philosophy, but continue with a largely empirical summation of research methods and approaches. Naoum (1998) also writes with a tendency towards the quantitative approach that reflects the long tradition of scientific/rationalist research. The authors all take a cautious approach to qualitative research, which is perhaps, a natural reaction to what is a radical change within construction management research. The nature of these books will have an effect on new researchers in the built environment, as they are the only texts specifically providing guidance to construction students. They will no doubt slow the integration of alternative research methodologies into new research.

However, in terms of published research, the debate has brought about significant change in the construction management research community. There is a much broader approach to research that perhaps reflects the diversity of the construction industry. It would appear that there is a general acceptance of qualitative methodology that was not apparent prior to the mid 1990s. Amaratunga and Baldry (2001) support the notion of a mixed methodological approach for research. They argue that although it is not the only suitable research approach it is particularly useful to address a wider range of issues in the built environment.

The following section of the chapter discusses the concept of and the research agenda associated with sustainability. Parallels are drawn between the evolution of research in construction management in general and the development of research into sustainability in an attempt to focus on appropriate research approaches for sustainability.

3.3 Sustainability Research Approaches

Sustainability has increased in status because of global concerns for the environment. Climate change has prompted significant activity by policy makers on a world wide scale. Sustainability has evolved in a similar manner to construction management in general. It has grown from a narrow preoccupation with environmental solutions to a philosophical approach that considers long term impacts and seeks to redress the balance in the world's eco-systems. It has been around for a short period of time in its current guise, being associated in the longer term with the environmental lobby. Concerns for the environment were originally centred on the conservation of nature. Development and conservation were seen to be in direct conflict (Hill and Bowen 1997). Brandon (1999) identifies the two predominant stances adopted. There are those that wish to conserve all earth's resources and those that believe that there is a "technological fix". The extreme positioning of what was then termed by some as environmentalism resulted in a predominance of research in the development of technical solutions to lessen the impact on the environment. The oil crises of the 1970s prompted significant movement towards energy conservation, and research into sustainability concentrated on technical aspects of environmental design.

In 1972, the United Nations held a conference on the Human Environment in Stockholm. From this event emerged the concept of "ecodevelopment" that aimed to harmonise economic, social and environmental objectives (Hill and Bowen 1997). It was not until 1987 that the World Commission on Environment and Development published Our Common Future which further evolved the concept of sustainability to: "*satisfy...aspirations for a better life without compromising the ability of future generations to meet their own needs*". This definition is frequently referred to in research associated with sustainability, but the broad concept had little or no effect on the research at that time. All of the eight abstracts found on the Construction Building Abstracts (CBA) database in 1987 associated with sustainability cover technical matters.

The significance of the construction sector to the success of sustainability was recognised at the 1992 Rio Summit with the formulation of Agenda 21. This had the aim of harmonising action in terms of sustainable construction and the built environment on a world-wide scale (Sjöström and Bakens 1999). As can be seen from Chapter 2, sustainability has been re-defined to incorporate social and economic factors. Brandon (1999) claims that over the last decade, a more holistic view has been adopted that has in turn shaped the concept of sustainability. It is now more about "endurance rather than conservation".

Research under the banner of sustainability is a recent phenomenon. In a review of two research databases (Ei Compendex and CBA) two trends are apparent. One, the number of articles published on sustainability has increased dramatically over the last decade and secondly, the subject matter has evolved (see also Table 2.1). In 1995 the majority of "sustainability" research was carried out in the energy and water sectors. Since Rio + 5 in 1997 there has been an increase in research relating to sustainability of the built environment. Building Research and Information (BRI) published a significant number of articles on sustainability during the late 1990s that addressed the wider concept of sustainability. Articles on sustainability are also becoming more common in the mainstream construction journals.

The UK government sponsors the Sustainable Development Research Network (SDRN) claiming that achieving sustainable development is a partnership between government and the academic/research community (DETR 2001). Sustainable development research supported by the network must address environment and resources objectives and economic and social objectives, "*calling on both the natural and social sciences*"(SDRN 2001). The SDRN identifies research approaches considered appropriate to sustainability ranging from "*conceptual research to empirical studies*".

The Construction Research and Innovation Strategy Panel (nCRISP) Research and Innovation Needs Document (Moore *et al.* 2000), identifies the levels that sustainability must be addressed on. These are Global; Community; Built Environment; Construction Industry; and Generic Issues. The document also sets out research objectives in terms of social, business and environmental considerations. It is clear from the report that the majority of new research is needed in the 'softer' areas of sustainability.

Although the quantity of research in sustainability has increased, and there has been a general acceptance of the wider concept, there is a tendency for research to stay within the relative familiarity of technical research. The Movement for Innovation (M4I) sustainability working group refers to the "triple bottom line" of economic, social and environmental factors essential to sustainability, yet their work has involved the development of purely environmental indicators for sustainable construction. Although this work is essential for the construction industry to be able to measure their environmental performance it does not address the wider concept of sustainability.

Hill and Bowen (1997) identify four "pillars" of sustainability: Social, Economic, Technical and Biophysical. They set out a wide range of principles for attainment of sustainability that highlights the broad area that sustainability covers as a concept. Social sustainability focuses on the improvement of the quality of human life; Economic sustainability considers renewability and affordability of resources; Technical sustainability encompasses green design, durability and quality; and Biophysical sustainability concerns the environment at large and the careful use of natural resources.

The scientific/rational research approaches commonly used in construction research are considered to be limited in their ability to address sustainability. Fairclough (2002) argues that traditional research approaches focus too heavily on material

processes. They do not adequately tackle the challenges posed by radical changes in the construction industry and its acceptance of sustainability as a long-term objective. There is a demand for research to address whole life cycles and construction's impact on the environment as well as fulfilling a "customer focused approach".

Brandon (1999) discusses the philosophical approach suitable to sustainability research and concludes that it would be "dangerous" to prescribe a single best approach. Sustainability considers the inter-relationship between systems, both human and natural. Impacts are far-reaching and difficult to predict. A philosophical approach to sustainability research must allow a holistic view of the world to be captured. He argues that philosophical frameworks will emerge in time as understanding of the subject increases and their importance must not be underestimated in such a "complex value-laden domain". It is further argued that environmental evaluation methods, such as cost benefit analysis that reduce comparisons to a common measure are inadequate for the full breadth of sustainability. They must be considered as a tool within a comprehensive decision making process.

Du Plessis and Edwards (2001) examine the limits of the western view of sustainable development. They state that it is based on a value system of individual wealth. They contrast this view with the traditional ethics of cultures in developing countries and suggest that this is of great importance in consideration of sustainability.

Research in sustainability appears to be at the stage construction management research was during the 1990s debate on paradigmatic trends. The main difference is that whereas change in construction management research was fought for by a small number of active researchers, sustainability research is changing under enormous pressure from governments across the globe. Research in sustainability has evolved

in a similar manner to construction research in general, albeit with differing motivating factors. The evolution of construction management research has not happened incidentally but as a product and catalyst of change in the construction industry. The sustainability agenda has had global pressure that has forced change. This has resulted in a faster change than was apparent in construction management in general. There has been a massive increase in research under the umbrella of sustainability, and a broader research approach is being encouraged to provide a better understanding of sustainability.

Sustainability as a concept has become so complex that conventional research approaches are considered inadequate. There is an acceptance that successful "sustainable" research will incorporate a wide range of research methods and approaches. There is general agreement on what the concept of sustainability means, which is apparent in the repetition and adaptation of the WCED definition of sustainability. The problem lies in the delivery and application of the concept in real terms. Research is still at a stage where it is simpler to address a small issue using a predominantly scientific/rationalist foundation within the overall framework of sustainability. Without a more inteprevist approach, sustainability research threatens to be limited in its ability to provide understanding and more seriously to prevent a more sustainable existence.

It is essential that research and industry are linked. This allows the two way relationship between the provision of information and establishment of the needs of the construction industry in terms of new knowledge and the scope and approach of the research undertaken by organisations involved in construction management research. It is perhaps more important than for any other subject area that research is integrated and knowledge is shared to enable the goal of sustainability to be pursued.

Ideas on sustainability are continually emerging through the literature. It is a topic that is extremely popular with government and industry alike. The Sustainable

Development Research Network published *A new agenda for UK Sustainable Development Research* (Eames 2002). This called for increased research on sustainability and promoted an integrated approach that it claimed had not previously been apparent.

3.4 Methodological approach to the research

Development of an appropriate methodology is essential in delivering meaningful research. The previous sections have discussed the trends within construction management research and sustainability research. Both subject areas have moved towards a broader methodological approach. Central to this paradigm shift has been a shift in research focus from technical issues to softer human issues. Human issues are often associated with subjectivity and value judgements. Traditional scientific methods of research have been unable to respond the questions raised by this area of research. Qualitative research methods developed in the social sciences have been adopted more frequently over the last ten years within construction research because of their use in exploring subjective issues. The technical aspects of construction research merit a technical quantitative approach and this methodological stance still predominates. The two approach often labelled under the banner of 'qualitative' and 'quantitative' research are often presented as opposing and supporters tend to argue the superiority of one approach over the other. The research debate in the 1990s brought confidence to the use of mixed methodologies. The research community has become receptive to a combined approach as it is increasingly shown to deliver more a broader understanding of complex topics.

This research is aimed at discovering the issues that are relevant to sustainability in the procurement system. The previous sections have established that a well constructed approach to research can combine a qualitative and a quantitative methodology. The study of sustainability involves the investigation of a multi-faceted concept that requires the study of the interactions between various systems

impacted upon the environment (Brandon 1999). A multi-paradigm approach has been used to address both the subjective value laden aspect of sustainability and the quantitative approach that characterises the procurement of a building project.

This research explores the complexity of sustainability. It was discovered that sustainability was ill-defined at project procurement level. The investigation of methodological approaches presented a number of options to investigate the concept. The choice of methodology emerged after consideration of the approaches in current use. Reflection on their success at addressing the issue of sustainability gave confidence in the ability of certain approaches to address specific issues. The broad scope of sustainability means that more than one approach is necessary.

Sustainability is based on the premise of Bell and Morse (1999) is a qualitative property of a system. This interpretation of sustainability addresses the concept as a subjective entity and suggests a qualitative approach to its investigation. Addressing the softer side of sustainability in isolation has led to a plethora of egalitarian policy statements that in practice are difficult to achieve. Pollington (1999) identifies the link between procurement and sustainability, bringing 'mega-considerations' together with micro-considerations'. This is intended to mean integrating broad social and environmental issues with the technical and financial aspects of a project. The procurement system is based on a financial framework. To exclude monetary considerations is an unrealistic proposition and any endeavour to understand the subjective issues of sustainability must be considered alongside financial factors (Ding 2005). This suggests that a quantitative approach is necessary to address the feasibility or relative importance of sustainability factors.

A combined methodological approach is considered appropriate and necessary to address the full scope of sustainable development. The research agenda in both construction management and sustainability have broadened in methodological

stance and support the use of research approaches designed to elicit meaning and comprehension from a situation.

The broad issues encompassed in this research are best served by the use of a framework into which research findings can be arranged and used to further knowledge. The conceptual framework for this thesis is Soft Systems Methodology (SSM). This framework is used to organise the phases of research. This is represented in Figure 3.2.

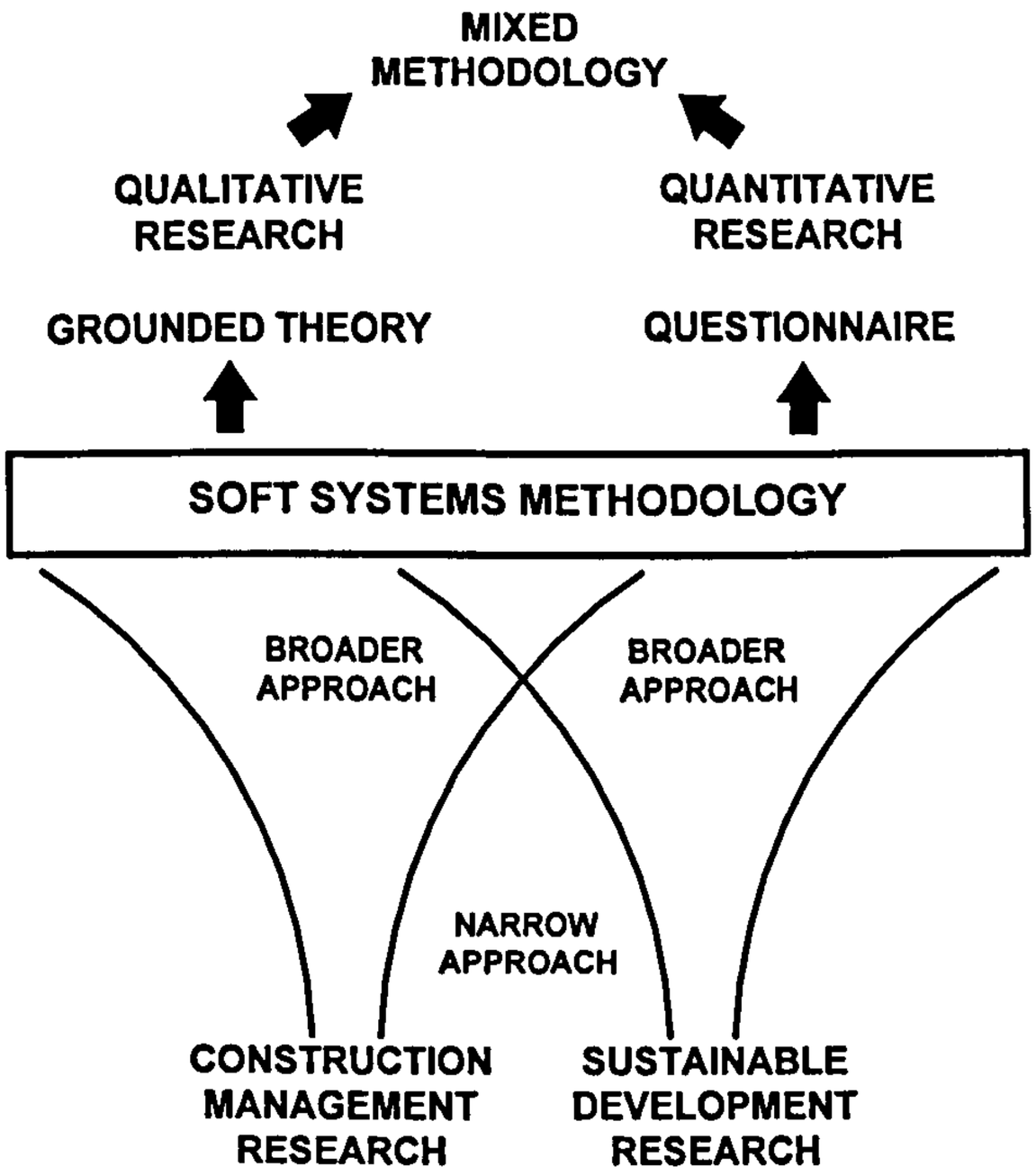


Figure 3-2: Methodological approach emerging from research agenda

The aims of the research are to consider meaning of sustainability at project level and then develop a means for integrating it into the procurement of a building project. Qualitative and quantitative research has been conducted to respond to the research questions. The research has been conducted in phases which are reported in Chapters 5, 6 and 7. Each of these phases of research are organised within the conceptual framework developed in Chapter 4. The study of sustainability has

academic relevance and the creation of knowledge is vital to furthering the concept. More important is the delivery of sustainable development in practice. The biggest change required for the delivery of sustainability is to decision making in the procurement process. It will require the consideration of *a multitude of ever changing criteria and negotiated trade offs between stakeholders* (Du Plessis 1999:389). The final phase of research progresses towards this goal.

3.5 Summary

The methodological approaches adopted in this research are integrated to address the spectrum of issues that are sustainability. Qualitative and quantitative approaches have been shown to contribute to a broader understanding of sustainability and the procurement process and they are increasingly used together to optimise the benefits of each approach. The methodologies for each phase of research are presented in detail at the beginning of each chapter in the thesis. The relevance of the approach to the conceptual framework is presented building up the understanding of sustainability.

3.6 Reflection on methodological development

With no formal knowledge of the philosophies underpinning research it was suggested to write a paper on methodological approaches (Carter and Fortune 2002a). The exploration involved in researching this paper proved a wonderfully rich process. Coming from a naïve perspective of research it was a real eye opener to discover the breadth and depth of possibilities for increasing knowledge. Reading *Sophie's World* (Gaarder 1994), unravelled some of the mysteries of philosophy that had until then been a 'black box'. Although no expert, it is now unmistakable that good research is firmly underpinned by the researcher's worldview.

Attempting more than one methodological approach has given the confidence in both qualitative and quantitative thinking. The experience gained has given the ability to reflect on the power of the approaches to increase knowledge. Qualitative

research has allowed an in depth understanding of meaning in areas characterised by subjectivity. Quantitative approaches allow a definitive picture to be created within a rigid framework. The limitations of one are supported by the strength of the other. The mixed methodology used in the three different phases of research have contributed to a broader understanding of the topic and enabled a practical solution based outcome.

'Methodolatry' was a term devised to describe a slavish attachment and devotion to a methodology (Janesick 1994:215 cited in Punch 1998). The advice received from supervisor and textbooks (Phillips and Pugh 2000; Dunleavy 2003) was to avoid deciding on a methodology before the research problem could be expressed. Punch advocates concentrating on the logic and rationale of the research before adopting a methodology that fits the research, rather than the other way round. The choice of methodologies has been made following in-depth investigation of the possible approaches. What was evident is that the same methodology is often used in quite different ways by different researchers. For an example of Grounded Theory being used in different ways refer to Sexton *et al.* (2001) and Loosemore (1999).

This PhD marks the start of a career in research and the process has involved an exploration of paradigms in construction management. The use of a methodology is very much a reflective practice (Schön 1996). Although the methodologies chosen for this research are believed to deliver the aims of the research, it is only by reflecting that this view can be formed.

Chapter 4 Conceptual framework

4.1 Introduction

This chapter introduces the theoretical framework for the thesis. The previous chapter discussed the research methodologies appropriate for the study of complex and ill-defined problems. This chapter presents the framework that is to be used for organising the research. This approach is being used to provide a deeper understanding and a structured approach to the mixed methodology adopted in this study.

4.2 Systems thinking

The thesis is based on a theoretical framework using systems thinking. Essentially systems thinking is a holistic approach to a complex problem. Sustainability can be viewed as an extremely complex concept. It has been defined in such a way that it touches on all things man made and natural. It is relevant from a global and a local perspective. It spans time and distance. Every action can contribute to or detract from the goal of sustainability. The complexity of sustainability is obvious. This research addresses how the procurement of a building project operates within the overall framework of global sustainability. Systems thinking can be used to model the concept of sustainability and in turn human activity that takes place within this model. This is useful in trying to link procurement practices in a meaningful way to the vast concept of sustainability.

Systems thinking is derived from a view of the world as a complex series of interconnecting elements that form a whole (Checkland 1981). Systems thinking is a methodological approach to understanding how things work. It is derived from a view that the world consists of structured wholes (i.e. soap bubbles; slow-worms; social systems). These systems exist under a range of conditions and exhibit general principles. Systems thinking involves looking at the connections between the objects and events as much as the entities themselves. A systems approach avoids the use of

reductionism by viewing the world in a holistic manner (Checkland 1981). It has been used over the last sixty years within a wide range of disciplines ranging from computer programming to social science. Boulding (1956) developing the idea of general systems theory, suggested that it did not seek to develop *a single general theory.* Such a theory would *be almost without content.* He goes on to state that *all that we can say about practically everything is almost nothing.* This suggests a need to create understanding at a level that has meaning to those interested in understanding a system. Boulding (1956) proposed a hierarchy of systems that could assist in understanding a whole world view of systems (Table 4.1).

Table 4-1: Hierarchy of systems (from Boulding 1956)

Level	Characteristics	Examples
1. Structures, Frameworks	Static	Crystal structures, bridges
2. Clock-works	Predetermined motion (may exhibit equilibrium)	Clocks, machines
3.Control mechanisms	Closed-loop control	Thermostats
4 Open systems	Structurally self-maintaining	Flames, Biological cells
5. Lower organisms	Organized whole with functional parts, 'blueprinted' growth, reproduction	Plants
6. Animals	A brain to guide total behaviour, ability to learn	Birds and Beasts
7. Man	Self-consciousness, knowledge of knowledge, symbolic language	Human beings
8. Socio-cultural systems	Roles, communication, transmission of values	Families, the Boy Scouts, drinking clubs, nations
9.Transcendental systems	'Inescapable unknowables'	The idea of God

Notes:
(1) Emergent properties are assumed to arise at each defined level.
(2) From level 1 to level 9: complexity increases; it is more difficult for an outside observer to predict behaviour; there is increasing dependence on unprogrammed decisions.
(3) Lower level systems are found in higher level systems-e.g. man exhibits all the distinguishing properties of levels 1-6, and emergent properties at the new level

Each level of the hierarchy has emergent properties that define a system's characteristics, increasing in complexity up the model. A new emergent property is required to specify a higher level of complexity. Lower level systems are found within higher levels of the hierarchy. The field of management research has made

use of this theoretical framework and focused research on the higher levels of the hierarchy. The hierarchy is accepted as *convincing*, but it is argued by Checkland (1981) that its reductionist approach has limited use above the lower levels. It does not provide an adequate account of systemic complexity.

Jordan (1968) proposed a separate systems model making use of three principles and three pairs of properties that are polar opposites. The first principle, 'rate of change' is defined by two properties, structural (static) or functional (dynamic) systems. The second principle, 'purpose' is defined by purposive and non-purposive systems. The third principle, 'connectivity' is defined by mechanistic or organismic systems. The taxonomy provides eight systems groupings, each with three properties (Table 4.2). The weakest part of this model is that a system is deigned to be 'purposive or non-purposive'. The model suggests that a system has purpose, or not, but that purpose is defined by the system not the observer or designer or user of a system. Its usefulness lies in the distinction of systems but its use in problem resolution is limited.

Table 4-2: Systems model (from Jordan 1968)

Principle	**Properties**
1. Rate of change	Structural (static) or Functional (dynamic)
2. Purpose	Purposive or Non-purposive
3. Connectivity	Mechanistic (or 'mechanical') or Organismic
In 3. a mechanistic system the remaining elements are unchanged when some elements (or the connections between them) are changed, removed or destroyed. In an organismic system a change in one affects all.	
The three 'bipolar "dimensions... generate eight cells:	
Cell	**Example**
Structural, Purposive, Mechanical	A road network
Structural, Purposive, Organismic	A suspension bridge
Structural, Non-purposive, Mechanical	A mountain range
Structural, Non-purposive, Organismic	A bubble (physical system in equilibrium)
Functional, Purposive, Mechanical	A production line (separate machines)
Functional, Purposive, Organismic	Living organisms
Functional, Non-purposive, Mechanical	The changing flow of water in a river bed
Functional, Non-purposive, Organism	The space-time continuum

Checkland (1981) considers the hierarchy of systems and the taxonomy of systems in terms of their relevance to social phenomena and concludes that although they are

both reasonable attempts to describe the world in terms of empirical data and scientific methodology, neither provides any guidance on addressing the higher levels of complexity associated with real-world problems. In an attempt to address this issue a typology was developed to provide a framework for human activity within the setting of a natural system. In it five classes of systems are defined (Figure 4.1). Natural systems, designed physical systems, designed abstract systems and human activity systems all situated within a transcendental system that is beyond knowledge.

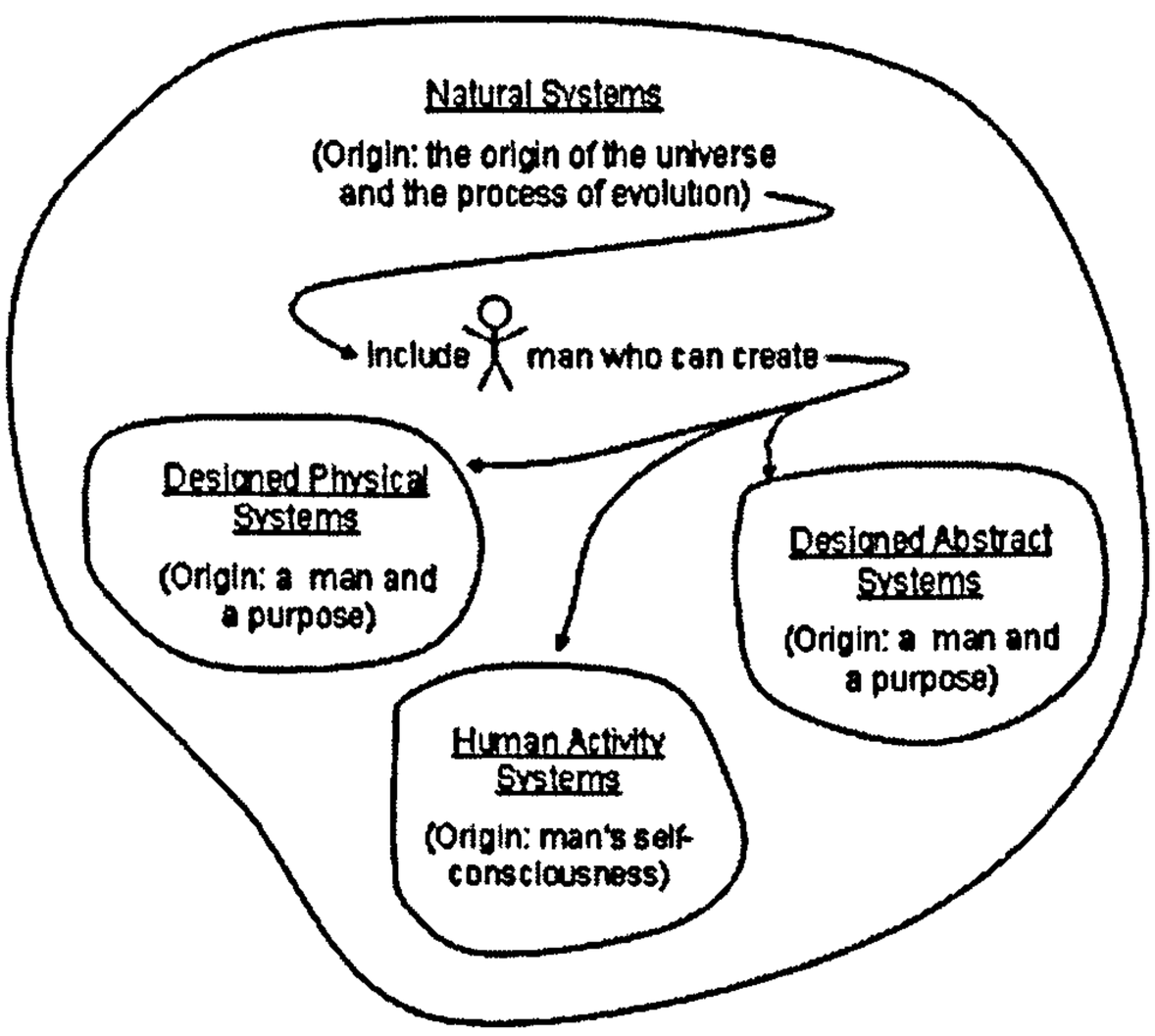


Figure 4-1: Five classes of system (from Checkland 1981)

The concept of this typology is based on an understanding that:

> *any whole entity which an observer sees as a figure against the background of the rest of reality, may be described either as a system of one of these five classes or as a combination of systems selected from the five.*
> (Checkland 1981: p111)

Systems thinking then may be described as the search for conditions governing the existence of emergent properties and an understanding of the relationship between such emergent properties and the systems within which they exist. There is an innate reliance on cause and effect relationships. Its use should make the interpretation of complex reality more achievable.

All systems may be considered as closed systems or open systems. Closed systems are self sufficient and comprise a fixed set of components or entities. Open systems are dynamic and rely on an interchange with the environment in which they find themselves. Ecosystems and social systems are examples of open systems that demonstrate complexity and structure. According to Clayton and Radcliffe (1996) dynamic systems may be fixed, periodic, chaotic or on the edge of chaos. Ecosystems and social systems are classed as 'on the edge of chaos' due to their complexity.

Systems thinking is divided into two approaches, hard systems thinking and soft systems thinking (Rosenhead and Mingers 2001). Hard systems thinking was developed in the engineering discipline as a 'goal-directed' methodology. A problem is defined and systems analysis is employed to reach a 'perfect' solution. This approach has proved inadequate to cope with the complexities found in the real world. A set of 'problem structuring methods' evolved in reaction to this shortcoming amidst a heated debate in the Operational Research community (reported in Rosenhead and Mingers 2001:2). This debate resembles the methodological debate in construction management research (Chapter 3.2) with resistance to the paradigm shift that emerged. The main thrust of the debate was a rejection of the 'limiting, technical emphasis' of the scientific approach to systems (Ackoff 1981). There was acknowledgement that the most important aspect is to decide what the problem actually is by making use of models to help group making decisions.

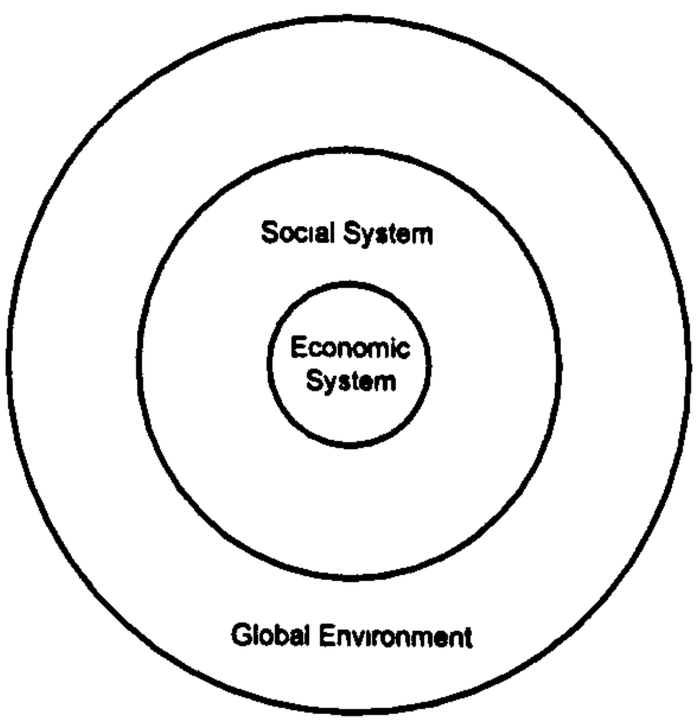
One of the methodologies to emerge is Soft Systems Methodology (SSM) developed by Peter Checkland in 1975. A 'Hard' systems approach was found to be inadequate to deal with a 'soft' problem within the management world (defined by Checkland as a human activity system (1981)). A new approach was conceived that incorporated a methodology for ill-structured problems. Their research reinforced that the 'problem', although recognisable was not easily defined. Human activity systems consist of a wide range of entities, and are subject to such numerous influences that time serves to modify the problem. The perception of the problem is subjective within a constantly shifting environment. Checkland and his team of researchers developed a framework for addressing real world problems.

The soft systems methodology (SSM) is described as a framework into which purposeful activity takes place. The original methodology consists of seven stages. Some of these stages are conducted in the real-world, some are conceptual and theoretical. Checkland describes this as 'systems thinking'. SSM was developed into a more flexible methodology after repeated usage and the revised framework explicitly integrates the cultural background of the system (Figure 4.7).

4.3 Sustainability and systems view of the world

Sustainability is concerned with the inter-relationship of a number of systems. In the common definition of sustainability, economic, social and environmental dimensions are given equal merit (Bruntland 1987). This suggests that at its simplest definition there is a need to combine an economic system with a social and environmental system to achieve sustainability. To model a world view of sustainability it is possible to use systems thinking and the model developed by Checkland (1981). In this model, human activity systems exist within natural systems. This implies a hierarchy of systems in which the human activity systems rely on natural systems in order to exist. This results in the supposition that the environment must have a higher status than either economic or social systems. To further this concept it could

be argued that economic systems exist because of social systems and are then dependent on social systems. This creates a simple model of sustainability (Figure 4.2) that demonstrates an interdependence of the environment, society and economy, which differs markedly to the concept of equality that is expounded in the 'triple bottom line' model. This concept was developed by 'SustainAbility', a consultancy aimed at encouraging multi-nationals to incorporate sustainability into their business (Figure 4.3).



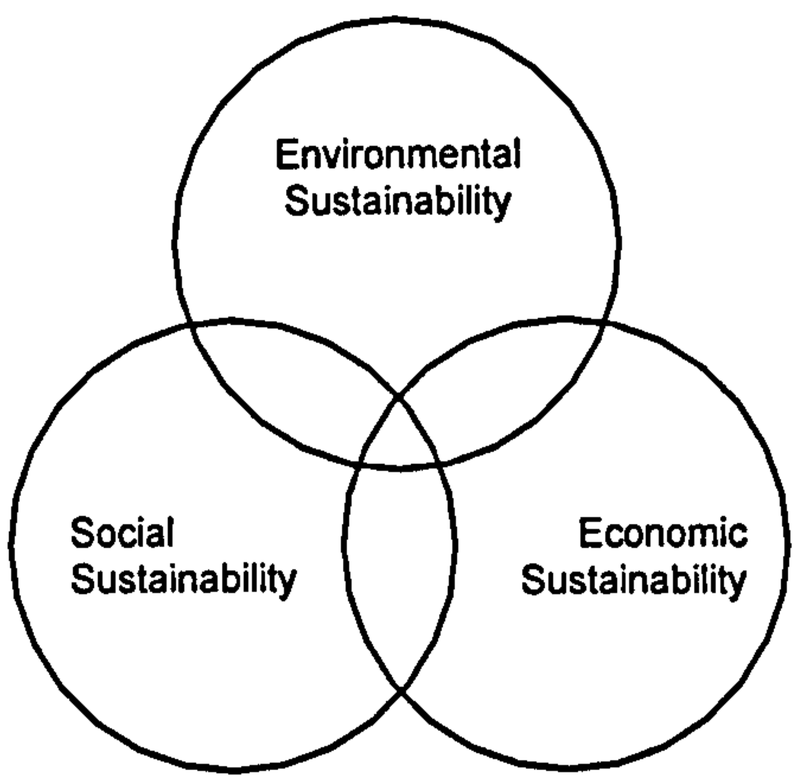


Figure 4-2: Systems model of sustainability **Figure 4-3: Triple Bottom Line model**

The systems model of sustainability is based on a hierarchy. The premise is that each system depends on a higher order system to survive. In a discussion on Dawkins theory on evolution, Clayton and Radcliffe (1996) develop the idea that sustainability is essentially about improving the survival prospects of a system. This occurs in organisms through a process of replication or reproduction that incorporates 'good genes'. This strives to improve the ability of the organism to find food and potential mates or avoid predation. This concept is primarily about maintaining a system and sustainability is achieved if the system remains the same or improves. The problem with this approach is defining the 'system quality'. This entity is fundamental to any thinking on sustainability. Figure 4.4 demonstrates a simple interpretation of system quality over time. The complexity is increased

further when more than one indicator is used and system quality is found to be increasing and decreasing at different rates over different periods of time. The information on system quality may be interpreted in different ways

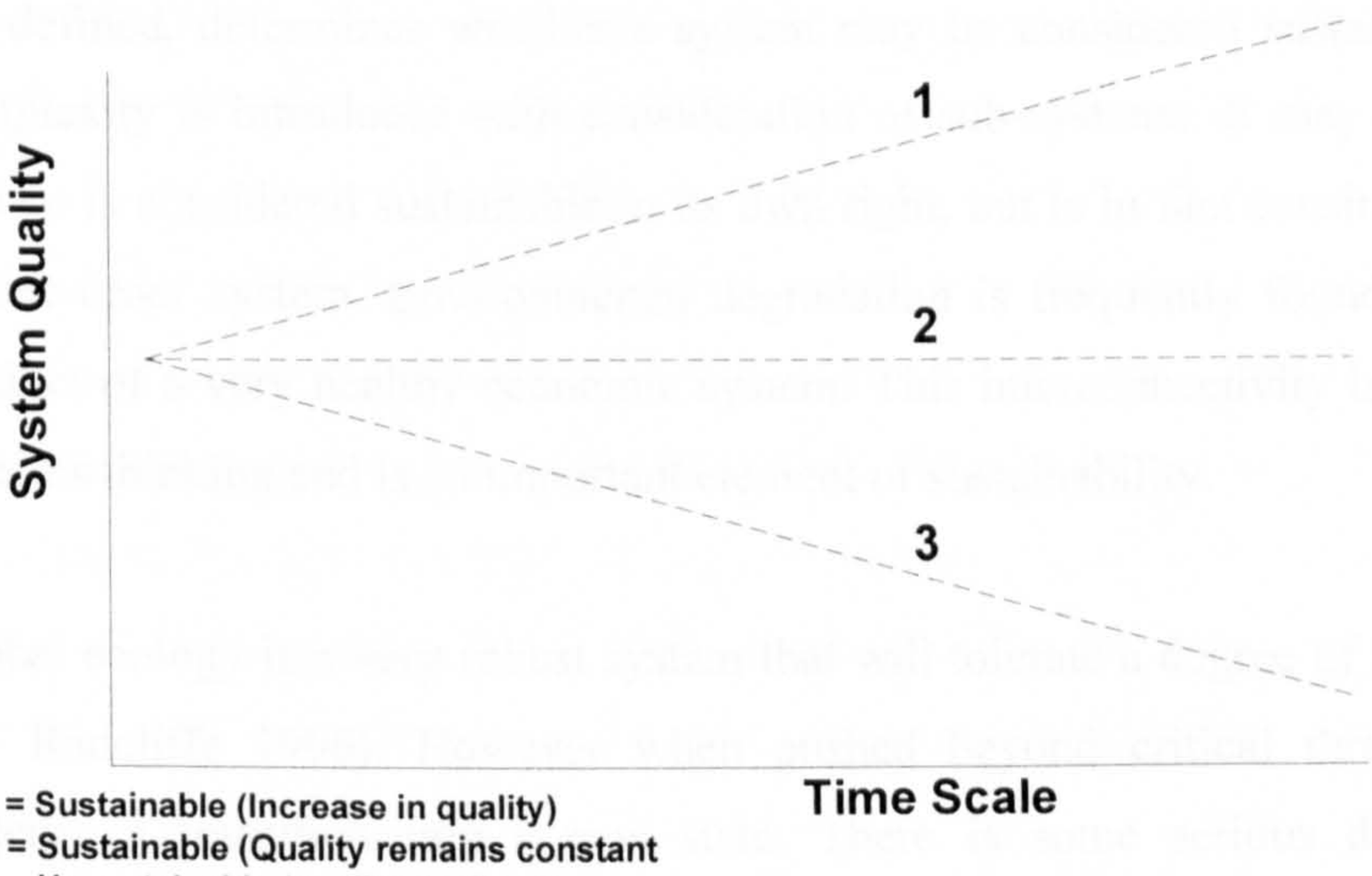


Figure 4-4: System quality and sustainability

The problem is that quality is such a subjective area, open to varied interpretation. This is evident in the array of measurement and assessment tools that have been developed (Chapter 2.2.6). According to Green and Simister (1999) a control and monitoring system is necessary to assess if a system is sustainable in a changing environment, but this would first involve defining *effectiveness, efficacy and efficiency.* One of the central measures of quality is 'quality of human life', particularly difficult to define, in affluent societies when it goes beyond the basic principles of survival, shelter and food. Another aspect of defining a system is one of dimension. Space and time are important parameters in defining the dimensions of a system (Bell and Morse 1999). The research for this thesis is carried out in the context of social housing procurement. To define the space for a system, it is

possible to conceive of the system as a housing unit; the whole project; the community; region; nation; or as part of the global system. Time may be defined as how long the project may be expected to last. This is a common enough notion in construction, but putting a time limit on a community or any higher order system is politically and socially impossible. Depending on how space and time dimensions are defined, determines whether a system may be considered sustainable. Further complexity is introduced with consideration of sub-systems. It may be that a sub-system is considered sustainable in its own right, but is in fact causing damage to a higher order system. Environmental degradation is frequently found to be the bi-product of a very healthy economic system. This interconnectivity is at the root of systems thinking and is an important element of sustainability.

Global ecology is a very robust system that will tolerate a degree of stress (Clayton and Radcliffe 1996). However when pushed beyond critical thresholds it will undergo a transition into a new state. There is some serious debate amongst ecologists if this 'new state' would be capable of sustaining human life. If it was possible to intervene or enhance the sustainability of a system it would be necessary to first define the system or systems that are to be sustained. Consideration of global sustainability can produce general definitions that include adequate food, water and shelter for all those in the world. When it comes to sub-systems there is a need to define that system in the context of the global system if a holistic view is to be achieved. The sustainability of the global system is dependent on the sub-systems to act in a way that does not impact negatively on the global system. The interdependence of sub-systems is not always recognised in fast moving commercial environments where economic pressures are foremost. This is evident in the procurement of the built environment. This sector is responsible for production of 49% of the UK CO_2 emissions emanating from buildings (Dickson 2002). The definition of a procurement system is much more difficult to interpret or define in terms of survival or futurity when short term financial gains are often taken in favour of long term environmental or social benefits. If a sustainable built environment is

the objective then the system, namely the procurement system, must be central to the delivery of sustainability.

4.4 Procurement organisations: a systems approach

Emery and Trist (1965) were central to development of systems thinking in the study of organisations. They argued that that the classical theories for understanding organisations were no longer appropriate. They observed that organisational change was occurring within an environment that itself was subject to change at an increasing rate and moving towards increasing complexity. Open systems thinking was proposed as a framework to better understand organisations and the changing environment in which they found themselves. This concept was elaborated through the idea of *the causal texture of the environment* (from Tolman and Brunswick 1935) in which an organisation could be modelled on the interconnections between internal processes and exchanges with the environment. This idea is useful in defining the way in which an organisation may react to external pressure. Handy (1998) in a discussion on organisational culture states the environment is crucially important in determining the culture of an organisation. The environment here is defined as economy; market; competitive scene and geographical and societal environment.

Organisational structure will primarily be determined by internal processes and the construction sector is typified by a *task culture* that is project orientated and takes the form of a net or network. A further notion on the idea of organisational culture is based on the idea that individuals within an organisation create the culture and this is determined by the type of people that are involved. Cox and Townsend (1998) suggest two views of human nature based on MacGregors theory X and Y: people are essentially trustworthy and have a desire to create value in the work they do; or people avoid responsibility and must be coerced to perform. It is clear that these two extremes represent a spectrum of possible human nature but there is a belief that partnering is only possible within a culture of trust and collaboration.

It is appropriate to define a group of companies and individuals working towards the delivery of a construction project as a 'procurement organisation'. This description best fits the array of stakeholders involved in the delivery of a building project. A number of organisations come together to deliver a construction project in what is often a temporary organisation. Handy (1993) refers to this type of organisation as entrepreneurial with an informal structure and centralised control. The client, consultants and contractors work towards achieving the goal of a building to the satisfaction of the client. In traditional procurement the parties involved act out predetermined processes within an often rigid contractual framework.

Winch (2000) describes the British construction industry in terms of a professional system, evolved over 150 years. The design and construction processes were effectively separated. At the centre of the professional system are well established professional bodies, operating primarily in the interests of their members. Muir and Rance (1995) refer to the 'discrete nature of the actors' in every construction project and suggest that this strengthens the independent positions of the professions, but does nothing to aid collaboration. The professional system produced an elitist hierarchy and encouraged adversarial relations. This system thrived within the culture of competitive tendering borne out of a desire by the client to reduce production costs (Curtis *et al.* 1989). This along with the tradition of contracting has resulted in a culture of penalty and reward. In a study of perceived failings of traditional contracting '*exploitation*' was cited as the most dominant problem amongst clients and contractors (Black *et al.* 2000). Consultants are more reticent. '*Decisions made with limited knowledge*' was found to be this groups perception of the main failing of a traditional contracting relationship. In a study of subcontractors' attitudes to supply chain integration, *mistrust between parties* was seen as a fundamental barrier to understanding each others needs (Dainty *et al* 2001). These failings reflect a process that is not built on a culture of trust or cooperation.

The last ten years, the construction industry has witnessed and experienced considerable change in the landscape of the procurement sector. The Rethinking Construction agenda has been catalyst for change in the way in which building projects are procured. New approaches to procurement have been dominated by the advent of partnering. This approach has given rise to alternative forms of procurement organisation, based on a different balance of responsibility and power, coupled with longer term objectives. Pryke (2004) makes use of social network analysis to explain the relationships that exist within the *new procurement* organisations. This approach enables the gathering of data relating to *intra-coalition relationships* and acknowledges the *multiple, complex webs of relationships.* This strengthens the notion of a procurement system based on a complex systemic framework rather than a traditional hierarchical organisation. Social network analysis is able to provide a much richer view of a procurement organisation but on its own its use is limited to understanding the social relationships that exist. This could be described as a sub-system of the whole procurement system.

Systems thinking is able to take into consideration the cultural framework of the procurement system and extend the boundary of understanding as far out as is feasible or desirable to assist in the understanding of a system.

4.5 Sustainability and procurement systems

The 1998 CIB World Building Congress focused on the issue of procurement and the role it has to play in the delivery of sustainability. There was acknowledgement that environmental standards and ethical issues must be integrated into the procurement system as 'cornerstones' of future practice (Pollington 1999). There is evidence that this has not materialised despite the volume of research and policy activity over the last six years. A Swedish studies shows that only 21% of clients stipulate 'environmental requirements' within their procurement strategies (Sterner

2002). A review of action on sustainability concluded that despite all the action that has taken place '*the sustainable construction movement has barely scratched the surface of creating buildings that can be remotely called sustainable*' (Kibert 2003).

Talbot (2002) suggests that partnering is the most suitable procurement framework to enable sustainability. There is a growing body of evidence to show the importance of adopting the appropriate procurement strategy from a sustainability perspective (Addis and Talbot 2001)

In Chapter 2 it was suggested that partnering and sustainability have similar key attributes - **cultural change; mutual goals; and long term objectives.** This similarity in philosophical viewpoint suggests compatibility between the concepts. The understanding of sustainability and the procurement approach present 'filters' to the delivery of sustainability within a building project. The proposition is that with the use of partnering there is a significant link between the sustainability and partnering and that this link can be used to good effect to further the delivery of sustainability (Figure 4.5).

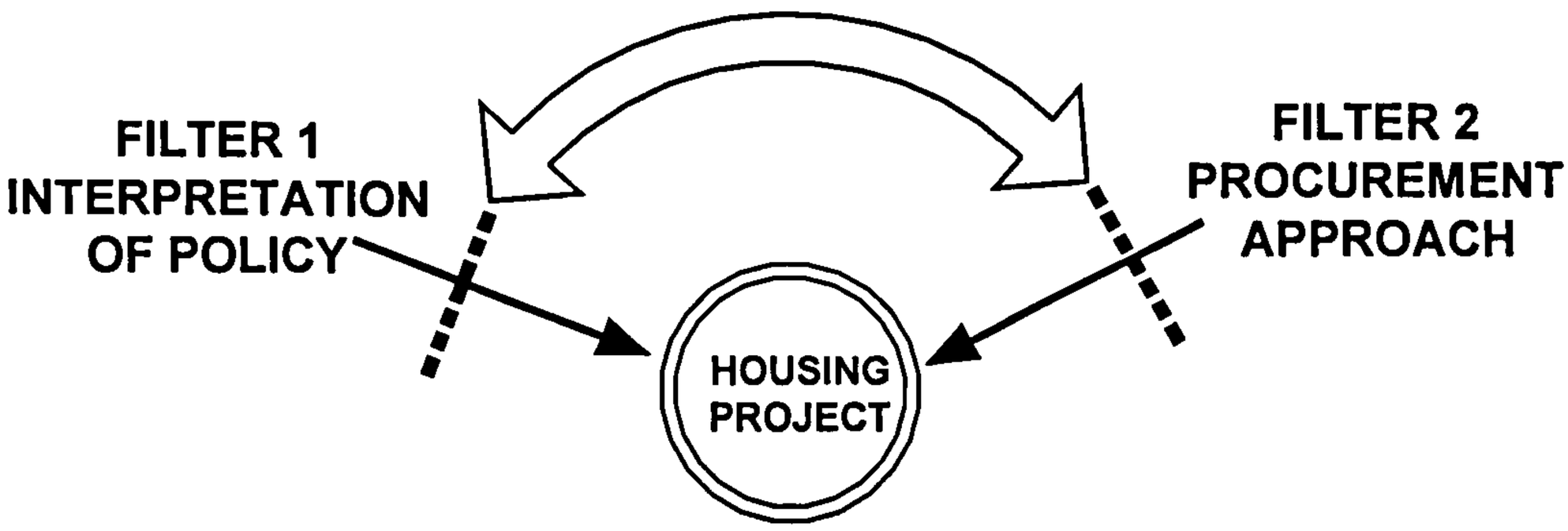


Figure 4-5: The link between the 'filters' of sustainable development

The use of models is a fundamental part of systems thinking. To link the procurement system with the concept of sustainability, it is useful to develop a model to show the connections and relationships between the procurement system

and the wider set of systems that build up as part of the global system. The higher order systems that the procurement system impacts upon are illustrated in Figure 4.6. The procurement system impacts upon the various systems in different ways. The procurement of a housing unit within a housing project is created within a community system (existing or proposed). This community system is in turn found within a regional system, set within the national and global systems. As Bell and Morse (1999) suggest each of these systems has a complex interplay with associated systems. By understanding the impact of the procurement system on the systems set within the global environment it is possible to build up a better picture of the sustainability issues as they relate to the procurement of a building project.

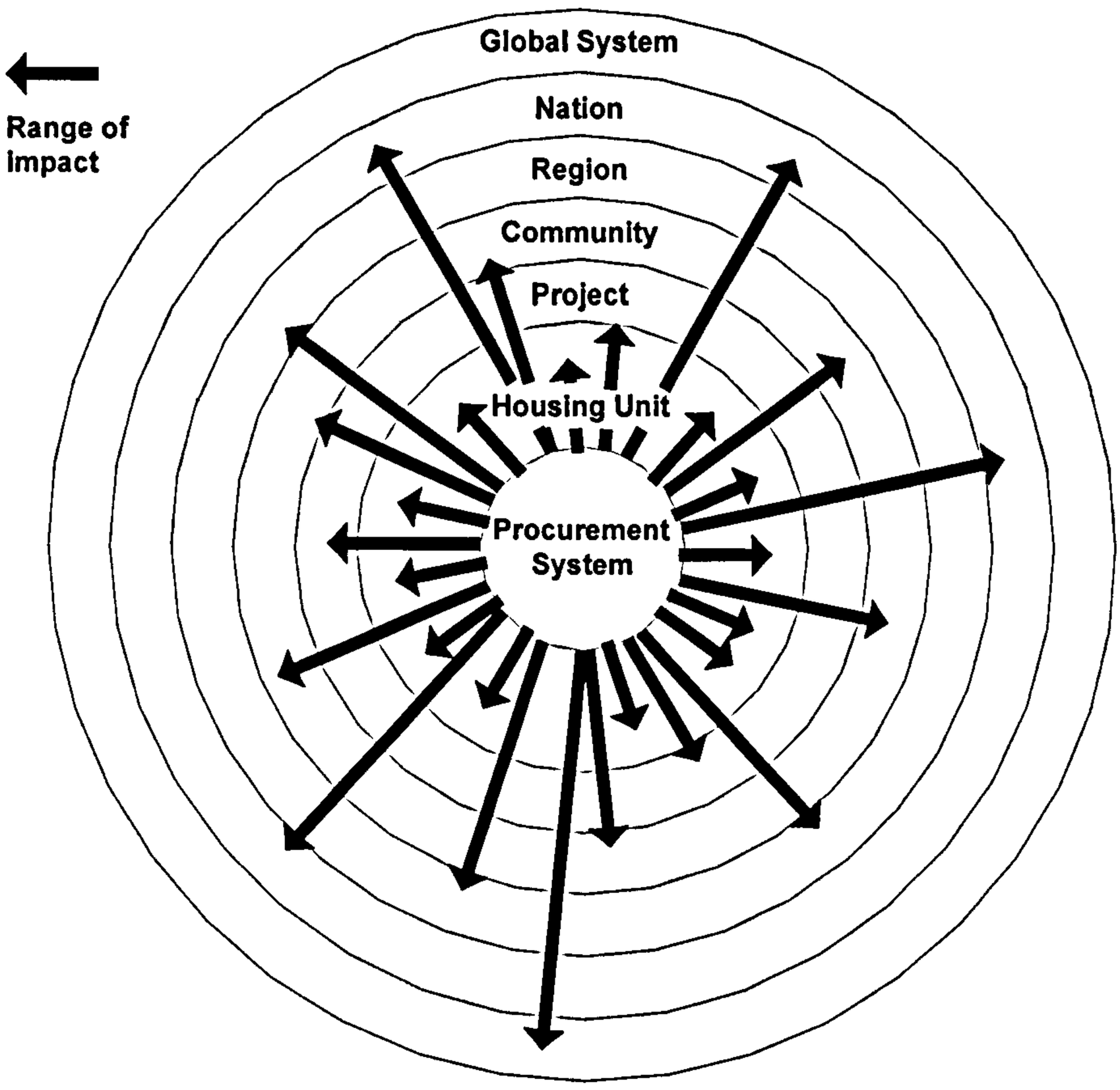


Figure 4-6: The impact of the procurement system on the global system

The model of the procurement system relates the project development to broader issues. This process enables decision making to take account of the aspects of sustainability relevant to a project and consider their gravity in relation to the impact they have on the global system.

4.6 Soft Systems Methodology

SSM is used by Green and Simister (1999) to improve the briefing stage of a project. They describe the approach as designed to respond to *multi-perspective social problems that defy any attempt at solution.* The methodology involves developing models based on a system encountering a 'problem situation' in the 'real world'. The model is then compared with the 'real world situation' to determine what changes could be made to improve the system. The approach is illustrated in Figure 4.7.

The original methodology was devised as a seven stage process. Checkland revised the methodology stating that the seven stage methodology was perceived as too prescriptive and developed a more flexible approach that integrated the cultural context of the problem situation (Checkland and Scholes 1990). The stages in this methodology although designed chronologically, were intended to be part of a flexible, iterative approach to purposeful activity.

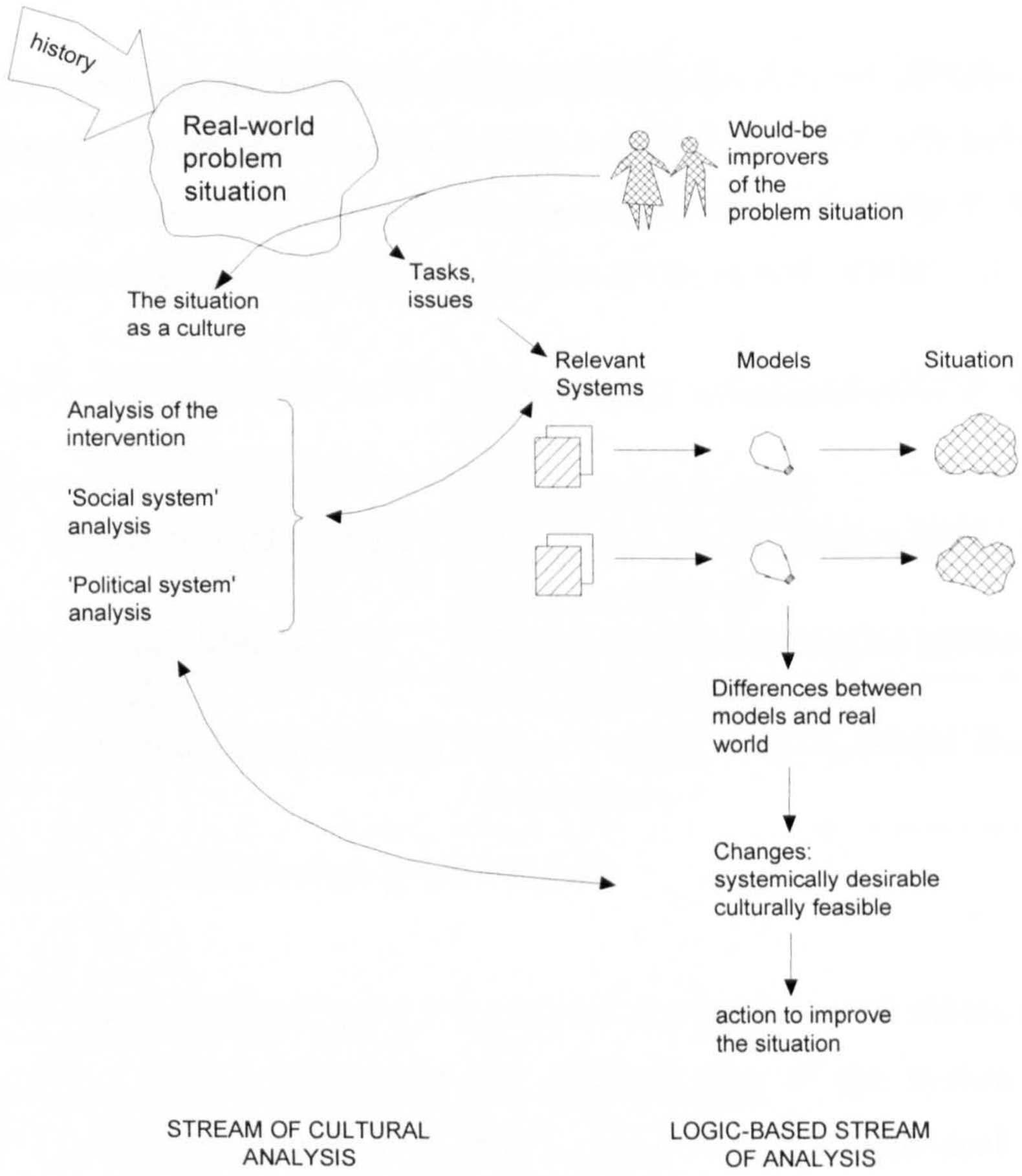


Figure 4-7: Soft Systems Methodology – the process (from Checkland 1990)

This adaptation of the methodology has resulted in a more holistic approach that is able to consider the wider world view. The core of this methodology is the comparison of conceptual models and real world phenomena. The aim of the methodology is to construct a model of the complexity encountered in the real world and test it against real world situations, to establish feasible and desirable change. This methodology is to be used to conduct the research for this thesis. The methodologies for each part of the research are discussed in at the beginning of each of the subsequent three chapters.

The methodology incorporates the establishment of a root definition for the system being investigated in order to develop a conceptual model. The technique developed by Checkland (1981) incorporates the process termed CATWOE. This involves six steps in order to derive the main purpose of the system. (Table 4.3)

C	Customer	Who would be victims/beneficiaries of the purposeful activities?
A	Actors	Who would do the activity?
T	Transformation process	What is the purposeful activity expressed as an input-output transformation?
W	*Weltanschauung*	What view of the world makes this definition meaningful?
O	Owner	Who could stop this activity?
E	Environmental constraints	What constraints in its environment does this system take as given?

Table 4-3: CATWOE stages (Checkland 1981)

The technique establishes a view of what a relevant system should do. By answering each question critically a better understanding of the system is derived. The technique can be conducted with a group or by an individual and the resultant definition is then used to construct the conceptual models in stage 4 of SSM. The process aims to develop a well formulated root definition by adopting a rigorous process. The incorporation of *Weltanshaunng* or 'world views' in establishing the root definition grounds the system within the environment it finds itself. One essential aspect of naming the system is to consider the transformation that takes place in the system. This has to be expressed in terms of an input-output transformation (Checkland and Scholes 1990)

By applying this technique to the research problem a 'root definition' can be produced. In an attempt to derive a root definition for the procurement system of sustainable social housing, the author applied the CATWOE elements. The following responses to each element emerged:

C Tenants and Communities

A RSL / Contractors / Consultants

T Housing need → Sustainable Community that meets the needs of tenants now and in the future

W Housing that meets the needs of the present community and the future community

O Funders / RSL / Contractors / Consultants / Tenants

E Environmental concerns / Financial constraints / Social demand

The following root definition was produced.

> A system, operated by the procurement team, (which includes RSL, contractors and consultants) used to benefit tenants, generally on low income, and improve the quality of the community in which it exists by creating social housing projects that meet the needs of today's communities and those in the future. The system is dependent on adequate capital and revenue support and must serve a beneficial social function and limit impact on the environment.

The claim that the root definition if formulated with attention to these elements will be rich enough to model is correct. The definition is rich in context. It extends to a wide and complex range of issues. While serving a purpose in establishing a definition of the system it does not seem to aid the understanding of sustainability for its delivery through the procurement system. The author's root definition represents one world view of what seems to be a very complex system.

The CATWOE technique has proved successful for defining process systems and expressing complex human organisational problems (Checkland and Scholes 1990). However it was only considered moderately useful in defining the problem in a

study of strategic briefing techniques (Green and Simister 1999). The main difficulty was found in defining meaning at each step. This seems to imply that the more complex the problem the less useful the CATWOE technique is at defining meaning.

Use of systems thinking to frame the research was chosen because of the systemic view of sustainability believed to be useful in improving understanding. The technique of CATWOE successfully frames the complexity of sustainability, but it is limited in its ability to establish meaning. Developing the root definition has confirmed the level of subjectivity that is a characteristic of sustainability. The process has resulted in a definition of the problem that is at a macro level well defined and holistic. However, at a micro level it is subjective and open to many different interpretations. This problem is of subjectivity is tackled in the next phase of SSM, the development of a conceptual model.

One fundamental aspect of SSM is that it is a methodology that is based on a participative approach. SSM was summarised as:

> *A methodology that aims to bring about improvement in areas of social concern by activating in the people involved in the situation a learning cycle which is ideally never-ending* (von Bulow 1989)

This implies that to be successful it is a prerequisite that the 'people' are involved in the process of modelling the 'problem situation'. A model of sustainable procurement has been developed using a Grounded Theory approach. This research approach is based on the assertion that theory is *inductively derived from the study of a phenomenon* (Strauss and Corbin 1990). This study was conducted with development managers from housing associations and consultants involved in the procurement of social housing. By using this technique the model is based on the perceptions of the stakeholders in the procurement system and assumes a bottom up

perspective. Chapter five reports on the grounded theory study and presents the model of sustainable procurement emerging out of the social housing sector.

The SSM methodology advocates the consideration of the political and social systems forming the culture of the 'problem situation'. The literature reviewed in chapter two reveals the level of confusion and uncertainty that is experienced in implementing sustainable development policies. A comparison is made between the Grounded Theory model and the frameworks and policies suggested for use in the practical implementation of sustainability. This process sets the procurement system within its contextual framework and finalises the creation of the sustainable procurement model.

The subsequent stage of SSM is the comparison of the model with the real world situation. A questionnaire was used to collect the 'real world' view of the model of sustainability. The survey was conducted amongst the housing association population and provides a valuable insight into the perception of sustainable procurement across the social housing sector. The comparison between the model and the testing of the model in the real world is used to identify change to the procurement system that is both feasible and desirable. The use of the quantitative methodology is useful in prioritising issues within the procurement system. The survey collects data on the procurement approaches that are most suitable for delivering sustainability. This further increases the contextual framework for the sustainable procurement model.

The final stage of this research is an iteration of the earlier two stages. A study based on the 'Delphi method' (Linstone and Turoff 2001) inco rporates the qualitative grounded theory approach and the quantitative survey to create a Consensual Sustainability model for use in the social housing sector. This model is tested in the real world and the results are presented in Chapter seven. This model makes use of a mixed methodology approach within SSM. The model is designed to assist

stakeholders in a project or programme to define the features of a sustainable procurement system and prioritise them. The approach is designed to allow a group to arrive at a consensus on sustainability that takes into account the individual's perspectives of the procurement system. This aspect of the model makes it useful in addressing the competing pressures that exist within the procurement of a building project while acknowledging the wider global sustainability system.

4.7 Summary

SSM is designed to be an iterative system. The approach developed using the methodology is aimed at identifying the features of a sustainable procurement system and identifying ways in which the system can be improved. The proposed model is intended as an iterative tool for use in the procurement of a building project. It aims to improve the sustainability of a project by allowing those involved in the procurement system a structured approach to defining sustainable features and prioritising them through the decision making process.

4.8 Reflections

The text books on SSM focus on the creation of a picture of a system. The CATWOE technique and use of 'rich pictures' in developing a view of a system are both useful techniques for enhancing group participation. However these tools will only work in a workshop format. This mitigates against their use in the development of a systems model from disparate actors. SSM allows the use of alternative methodologies and research approaches within the overall framework. This option has been chosen in favour of the suggested techniques because of the lack of coherence that this approach was thought to have for the complexity associated with sustainability.

SSM is methodology that advocates flexibility and as such is extremely relevant to the value laden concept of sustainability (Brandon 1999). The iterative nature of the

process means that the Consensual Sustainability model can be incorporated into a cycle of activity. It is thought that this approach will lead to a more useful outcome and a greater level of engagement.

Chapter 5 A Grounded Theory of Sustainability

5.1 Introduction

The research problem that emerged out of the literature review in Chapter 2 was the need to establish meaning at project level for the concept of sustainability. It was shown that the interpretation of policy was a filter to the way in which sustainability was defined for a building project. The first phase of research was designed to establish a better understanding of how sustainability was viewed at project level. A study was conducted to discover the perception of sustainability and partnering for the social housing sector. The rich qualitative data collected during this study was used to develop an emergent model of sustainability and how it relates to the procurement system. This was developed from the perspective of those involved in the procurement of social housing projects. The emergent model was compared with a model of sustainability derived from an analysis of established frameworks and policies of sustainable development.

This chapter sets out the first phase of research within the overall conceptual framework and explains the relevance of this phase to the overall aims of the study. The first section presents a justification of the choice of methodological approach and its application to the research problem. The grounded theory approach adopted is explored and presented. The second section of this chapter presents the phase of the study that was conducted within the social housing sector. The research consisted of two waves of interviews that collected data on policy and frameworks. Each of these phases is presented in terms of the data collection, subsequent analysis and the development of a propositional model. The emerging views from the interviews were compared with the policy frameworks. The research identifies significant features relevant to the perception of sustainability in the procurement of social housing from policy and practice perspectives. A theory of sustainability is constructed to model the procurement system within a conditional matrix that assists

in linking the understanding of sustainability from a top down and bottom up approach.

5.2 Relationship to Conceptual Framework

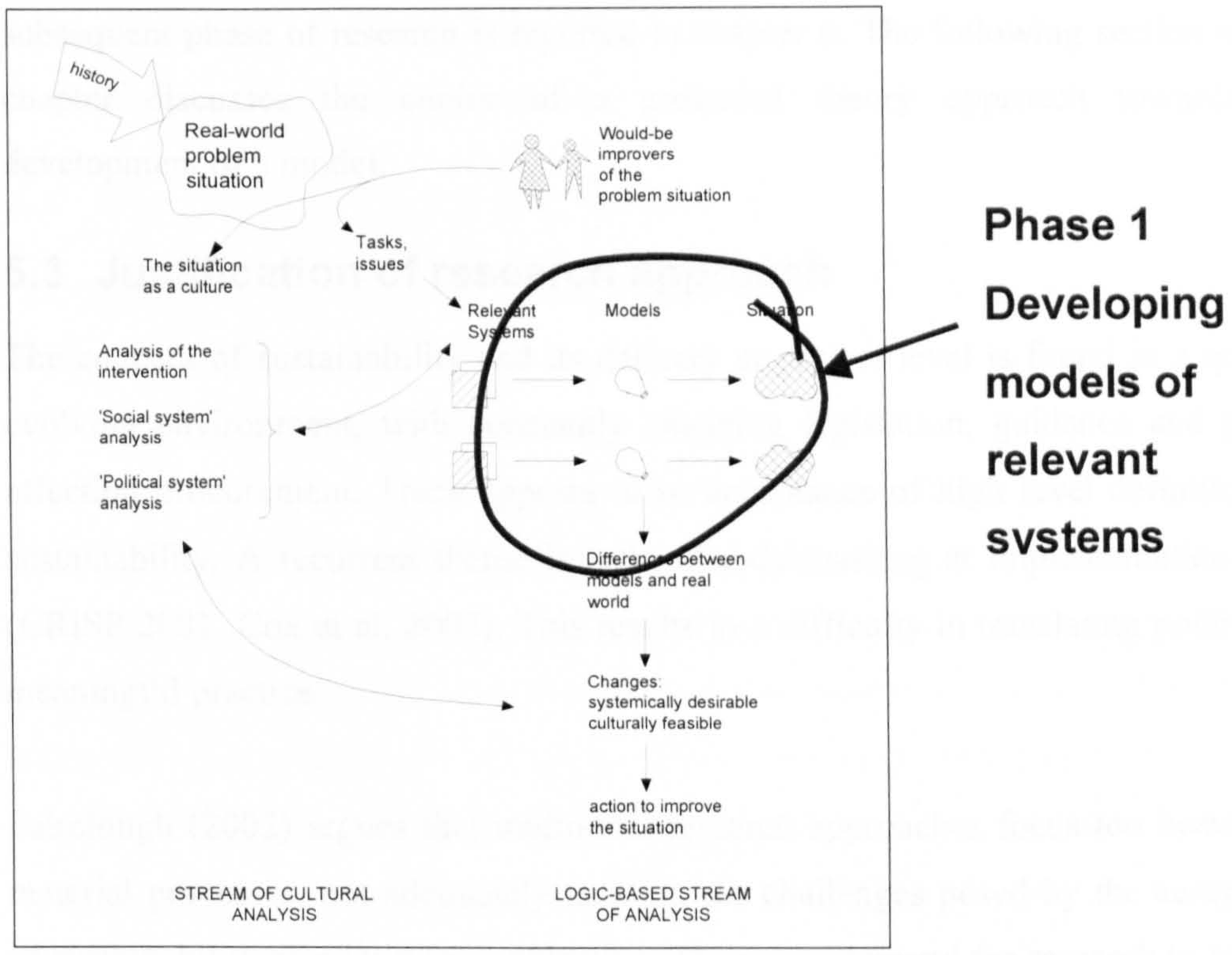


Figure 5-1: Research Phase within SSM Framework

The research problem that emerged out of the literature review in Chapter 2 was the need to establish meaning at project level for the concept of sustainability. The previous chapter developed the concept of a sustainable system in an attempt to organise the way in which sustainability can be understood. Connecting policy and practice requires consideration of the linkages between them. Systems thinking enables these connections to be explored and an understanding to develop of the way in which the procurement of a building project impacts on the wider world. One of the aims of the research is to develop a framework that builds a systems view of sustainability in order to make explicit the connections the procurement system has within the global sustainability system.

Soft systems methodology (SSM) makes use of a process of developing models of a real world problem and comparing it with a situation in the real world. The first stage of this process is developed in this chapter. A model of sustainability emerges using a grounded theory approach. This model is then tested in the real world. This subsequent phase of research is reported in chapter 6. The following section of this chapter discusses the choice of a grounded theory approach towards the development of a model.

5.3 Justification of research approach

The concept of sustainability and its delivery at project level is found in a quickly evolving environment, with constantly changing legislation, guidance and policy affecting procurement. There appears to be acceptance of high level definitions of sustainability. A recurrent theme is lack of understanding at implementation level (CRISP 2001, Cox et al. 2002). This results in a difficulty in translating policy into meaningful practice.

Fairclough (2002) argues that traditional research approaches focus too heavily on material processes, not adequately tackling the challenges posed by the acceptance of sustainability as a long-term objective. There is a demand for research to address whole life cycles and construction's impact on the environment as well as fulfilling a "customer focused approach". The Sustainable Development Research Network (SDRN) states that research in sustainable development calls on approaches from both the natural and social sciences (SDRN 2001) to underpin the work in this area.

Qualitative research is used by researchers concerned with human behaviour and functioning (Strauss and Corbin 1990). This approach is considered best when attempting to elicit meaning from a situation. Qualitative data focuses on *naturally occurring, ordinary events in natural settings* and provides a good understanding of real life situations (Miles and Huberman 1994). It is argued that qualitative data is *rich and holistic* and is useful in revealing complexity and meanings, people place

on the social world around them. Tesch (1990) in an overview of research approaches aligns grounded theory with research that seeks to discover regularities and identify and explore their connections. This research makes use of a grounded theory approach and the rigorous way in which it can be used to deal with value laden concepts. This involves a 'systemic procedure' which inductively derives a theory from the phenomenon it represents (Dainty *et al.* 2000a).

5.4 Grounded Theory Methodology

Grounded Theory method (GT) is a qualitative research approach developed by Glaser and Strauss in 1967. It came out of a need for a rigorous and systematic approach to social research, in response to extreme violations brought to data by... positivistic research using forcing conjectured theory (Glaser 2001:6). Glaser further stated that conceptualisation was the core of the GT process. It does not describe a phenomenon but generates propositions from the data that may be used to explain behaviour from which the data is generated. The methods used are scientific and allow GT to be defended against positivist traditional approaches to research. Significance, generalisation, rigour and verification are all incorporated into a well developed grounded theory (Strauss and Corbin 1990).

A grounded theory is inductively derived from the study of a phenomenon, which is inadequately explained by existing theory. It attempts to discover regularities through the categorisation of elements and the exploration of their connections (Strauss and Corbin 1990). It is particularly suited to the study of local interactions and meanings and their relationship to the social context in which they occur. Rather than testing relationships among variables, it involves discovery of relevant categories and the relationship between them.

Grounded theory is a longitudinal research methodology, capturing streams of research (Leonard and McAdam 2002). This allows processes to be mapped as opposed to the static snapshot achieved by quantitative methods. It is argued that

meanings are socially constructed, negotiated and changed over time (Loosemore 1999). Grounded theory methodology encourages a holistic view of a phenomenon to be mapped, allowing an understanding of its direction to develop.

Use of grounded theory methodology is an iterative process involving comprehension, synthesis and theorising. Comprehension is gained through the collection and preliminary analysis of data. It should be understood that the data may be qualitative or quantitative. Adequate data must be gathered to allow an in-depth understanding of the phenomena. Synthesis is achieved through the inter-relationship of data collection and in-depth analysis. This can be a lengthy process that is both time consuming and requires a high degree of discipline. Additionally creativity plays a key role. Each relevant word, phrase or chunk of data must be coded. Coding is vital in the breaking down of data, conceptualisation and development of theory. This involves the researcher in allowing a creative perspective on the development of categories and codes. Conceptualisation is the core process of grounded theory. This differs from descriptive analysis common to many qualitative research methods (Glaser 2001). Concepts differ from description in that they are abstract and transcend time, place and people. A grounded theory is gradually developed through the process of theoretical sampling. This involves sampling on the *basis of concepts that have proven theoretical relevance to the evolving theory* (Strauss and Corbin 1990: 177). Sampling procedures may change as the study progresses. It is a cumulative process that should be well planned but remain flexible enough to respond to the evolving categories and concepts.

Existing literature plays an important and varied role in grounded theory. It forms a considerable background to the researcher and the participants in the research. It can therefore not be discounted. Grounded theory studies explain phenomena in the light of evolving frameworks. It is vital that existing theory does not impede discovery by "forcing" the theory to comply with preconceived notions. Therefore, the existing literature is used in a reciprocal way. The original theory can provide concepts and

relationships that can be tested against actual data. If the intention is to extend or amend existing theory, then it can be amended to fit real life situations discovered by the grounded theory approach.

Finally grounded theory is useful in investigating processes. When process is built into the analysis of data, a dynamic theory can be built. Process shows the interactions associated with a phenomenon, in the form of incidents and their relationships. Analysis of process can explain why change will occur or not in the face of changing conditions and their consequences. The generation of a coherent theory requires the incorporation of four criteria – 'fit'; 'understanding'; 'generality'; and 'control' (Strauss and Corbin 1990).

5.4.1 Grounded Theory Method

Concepts are the basic unit of analysis in grounded theory (Strauss and Corbin 1990). Discovery of concepts marks the difference between basic description and the development of theory. Conceptualisation occurs when the researcher takes the raw data and breaks it down into discrete ideas. Similar ideas are identified and brought together to represent an emerging phenomenon. In GT method the process of conceptualisation results in the labelling of concepts which are brought together in categories. This is called 'open coding'. In the process of coding each category can be given properties and dimension. Properties are the characteristics or attributes of a category and add to the understanding of that category contextually.

This initial analysis provides an opportunity for ideas to emerge from the data. In essence the data is fractured and grouped to allow emergent properties to be generated. This aligns with the idea of General Systems Theory and the idea of emergent properties of a system. A system is defined by its emergent properties. It is these properties that have no meaning for the single entities but are relevant to the holistic view of the system.

Axial coding involves making connections between categories. The coded categories may be developed and linked to other categories using a paradigm model presented in Strauss and Corbin (1990). This model requires each category to be developed in terms of the following features:

CAUSAL CONDITIONS ⟶PHENOMENON

⟶CONTEXT

⟶INTERVENING CONDITIONS

⟶ACTION / INTERACTION STRATEGIES

⟶CONSEQUENCES

Use of the paradigm model allows the systematic treatment of complex data. The development of axial coding means that each category and sub-category is considered in ways that relate to other categories. The whole area of research is developed systematically and holistically. Categories are not treated in isolation. They are explored in their context and in relation to their interaction and consequence with other categories. This process is useful in relating GT to the conceptual framework of SSM, because of the similarity in emphasis on relationships between the parts of the whole.

GT is an iterative process. The researcher moves between collection of data and analysis in a cycle that may be repeated as often as is required to reach theoretical saturation. This occurs when the data no longer generates new theoretical elements but confirms patterns and relationships that have already been found. The scope of GT allows it to be used to research

5.5 Research approach and methods

This research phase was embarked upon as an exploratory study. Naoum (1998) believes exploratory research is useful when there is limited knowledge on a subject. This is the case with sustainability from a project perspective. Very little research from a bottom-up approach exists and what little research there is, points to a need for a better understanding. The exploratory study therefore sets out to discover the perception and understanding of sustainability at delivery level in the social housing sector. In view of this, a grounded theory methodology was adopted for the research, in an attempt to draw meanings and ideas from the participants. The study sought to engage individual participants in the procurement process to generate a theory of sustainability from a project perspective. The phase 1 research involved two rounds of interviews and an analysis of frameworks and policy documents. A grounded model emerged from analysis of the interviews and the frameworks that allowed a comparison of practice and policy to identify significant differences.

5.5.1 Data Collection Process

Qualitative data was collected from two sources: interviews; and policy and framework documents. This "data" provided the material for generating a set of propositional models of sustainability in the procurement of social housing.

Interviews

Punch (1998) states that interviews are a good way of accessing people's perceptions and constructions of reality. Interviews were selected for data collection because of the freedom that participants may be allowed in expressing their opinions and ideas on a subject. In collecting the first set of qualitative data, participants were invited to take part in an interview. The aim of the interview was to establish the meanings and values associated with the term sustainability and further explore the ways in which it is being applied. Three main types of interview are identified by Minichiello (1990): Structured; semi-structured; and unstructured. The unstructured interview is seen as a 'powerful' research tool and can be used to produce rich and valuable data

(Punch 1998). The interviews for the study were conducted with a minimal structure, in order to maximise the richness of the data. The agenda for the interviews was to cover the topic of sustainability in a broad sense and specifically in terms of development activity. An interview framework was prepared to guide the conversation. This comprised only a short list of bullet point intended to guide the interviewer around the conversation and ensure the key areas of sustainability in general and partnered procurement were covered (Appendix A).

The interviews lasted about an hour in length and were planned to allow the interviewee the freedom to express their ideas and feelings on their housing association's position within the sustainable development policy framework. The interviewees represented their organisations but were encouraged to express their opinions freely as the exchange was to remain confidential. It was believed that this presented the chance of a more representative view from a decision maker in the procurement process. Each interview was audio-taped and then transcribed verbatim.

Selection of Interviewees

Sample selection for quantitative research is frequently generated from the logic of the laws of probability and statistics. Mason (1996) suggests that qualitative research demands an alternative logic of sampling. It is of vital importance that the sample is selected using a logic that is equally rigorous but more appropriate to the research approach. The sample will have to represent the wider universe from which the sample is taken on the grounds that it is not practical to include the whole population. The data to be generated should signify the population as a whole. It is therefore necessary to establish what this population is and select the sample on the basis of an appropriate relationship with this wider universe.

The first wave of interviews was conducted with the development managers of housing associations. To achieve a balance in the views that might emerge it was considered useful to include not only representatives from housing associations, but

other participants involved in the procurement process. Therefore, a second wave of interviews was held with consultants involved in social housing procurement. Interviewees have been selected from a range of housing associations (3), professional consultants (3) and a representative from the Scottish housing agency (1). The participants were selected using *discriminate sampling*. This maximises the opportunity of relevant data collection from a small sample. The housing associations were chosen to represent small, medium and large organisations. The consultants were selected from a social housing database that covered the population that the housing associations had been selected from. As this study represents an exploratory study it was agreed that the theoretical sensitivity lost by deliberate choice of certain housing associations and consultants could be out weighed by the higher chance of good quality data. In the case of the housing associations, the participants were approached through contacts. The consultants and the housing agency participant were contacted by a personal letter inviting them to participate in the study.

Policy and Framework Documents

There has been considerable activity in development of frameworks for the implementation of sustainability in the procurement of construction projects. This literature forms an important element in the professional and disciplinary background of researchers and practitioners involved in development of buildings. Sustainable development policies and theoretical frameworks are intended to guide construction activity to attain the goal of sustainability. One of the aims of the research is to establish the features of sustainability that are apparent at practice and policy level. A grounded theory approach to the literature was designed to provide a theoretical understanding of sustainability from a policy perspective. Policy and framework documents were assembled from the literature. Publications believed to have relevance to or impact on the social housing sector were selected and subsequently analysed to develop a propositional model. This process was aimed at developing a picture of the main issues that are emerging from policy level.

5.5.2 Data analysis

Analytical Framework

The central premise of grounded theory is to generate theory out of data. This is only achieved when the researcher develops concepts from the data and avoids describing a phenomenon. The process of developing hypothesis is only possible if there are concepts present to relate to one another (Glaser 2001). Glaser argues strongly that theoretical development is not possible if the data has been analysed using descriptive techniques. Grounded theory relies on the process of conceptualisation. To this end the paradigm model (figure 5.1) proposed by Strauss and Corbin (1990) is used as the analytical framework for this phase of the research. This model is designed to assist the researcher in sorting categories and to help understand their complex relationships. This approach aims to unravel the complexity found in the concept of sustainability at project level. In doing so the key features of sustainability can be understood in a meaningful framework that explains their relationships and increases the ability of those involved in procurement to take steps to improve the delivery of sustainability through a construction project.

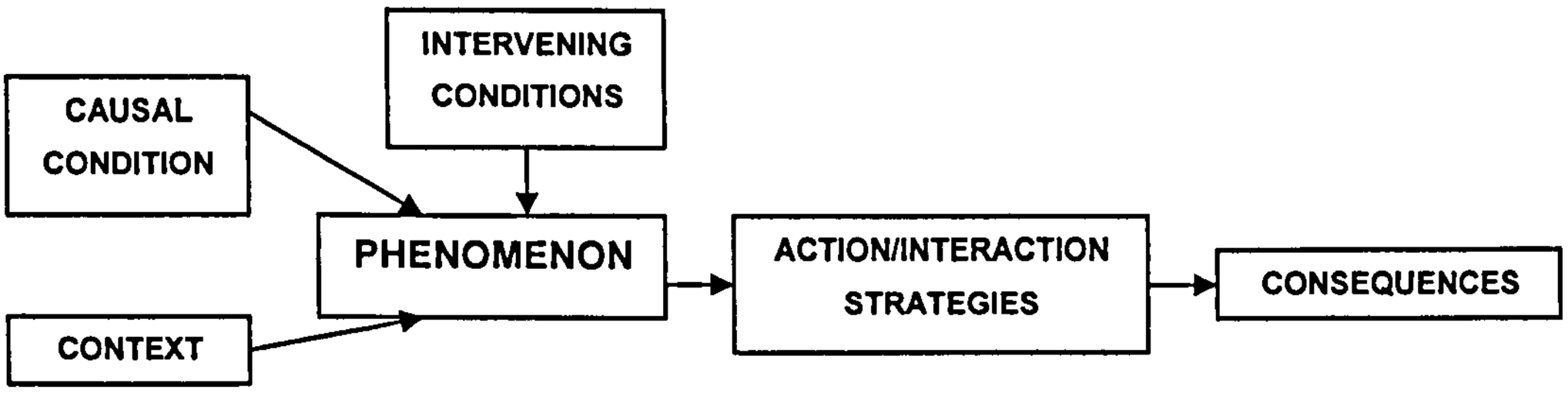


Figure 5-2: Grounded Theory Paradigm model (developed from Strauss and Corbin 1990)

The paradigm model is used to develop a set of relationships that exist for each of the main categories that emerged out of the data. This analytical process establishes the causal conditions and context of a main category or phenomenon and the

intervening conditions, action/interaction strategies and consequences associated with it. The paradigm model is further developed with the use of a conditional matrix.

The conditional matrix is used to represent the categories within a *transactional systems* model of the world (Figure 5.2). The matrix abstracts levels of the world that relate to the research area. The general model ranges from an international level to the micro level of action in the immediate context of the phenomenon of sustainability. This analytical process enables a better understanding of the range and dimension of conditions and contexts that are impacting on the phenomenon of sustainability at the project level.

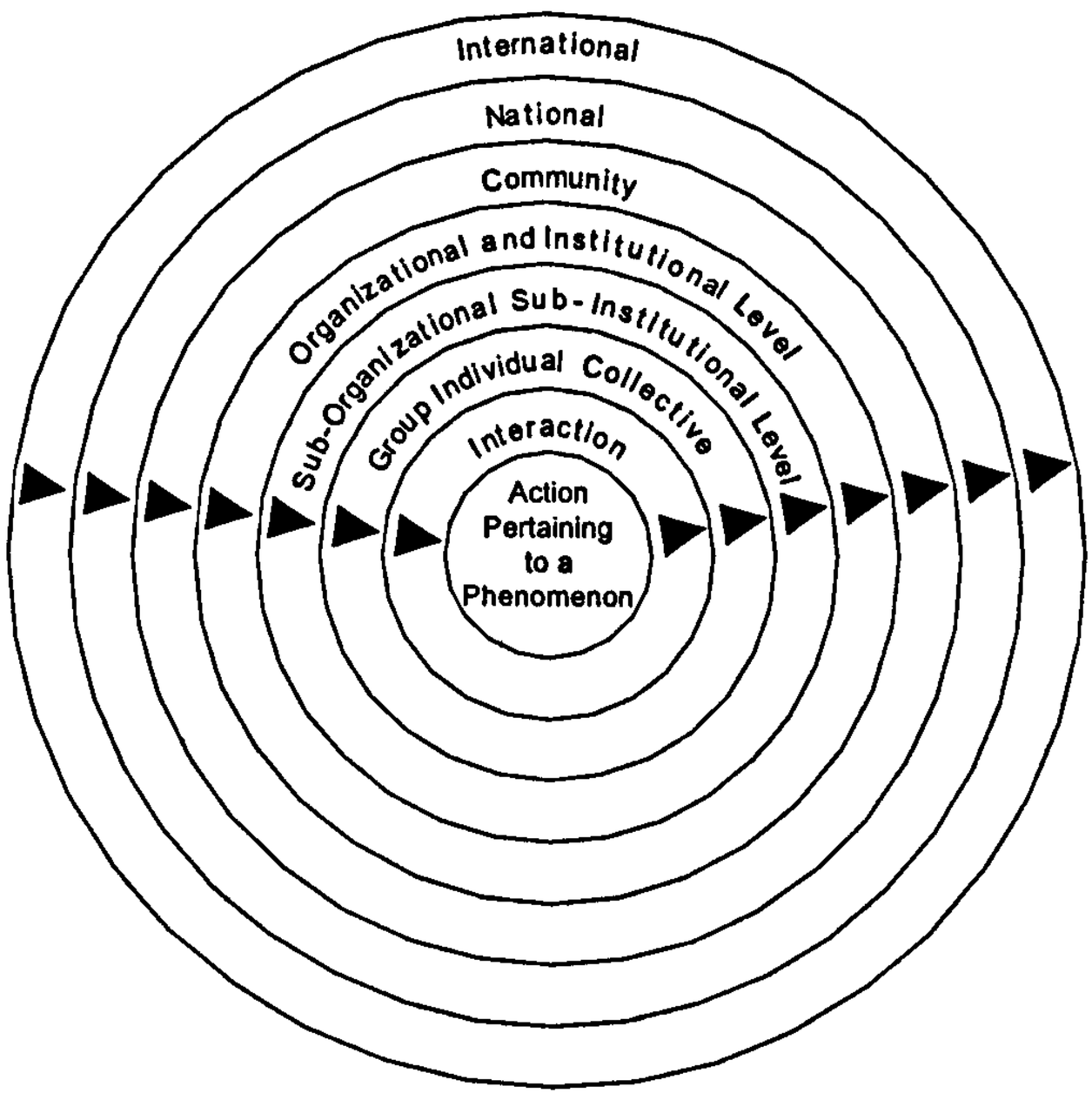


Figure 5-3: Conditional matrix (developed from Strauss and Corbin 1990)

The Coding of Data

The data collected during the interviews has been handled using the coding system developed for use in grounded theory methodology. The transcripts of the interviews were analysed using NUD*IST qualitative software. Dainty *et al.* (2000b) believe

that computer aided analysis can enhance qualitative research, by managing data systematically and allowing handling of large amounts of qualitative data that would be impractical manually. The software enables the results of analysis to be arranged in a hierarchical tree structure. The central phenomena relating to sustainability form the root/s of the tree and sub categories or nodes are generated. The initial analysis involved open coding the data. Three hundred and fifty three individual nodes were identified. Axial coding then revealed relationships between nodes and sub nodes. This process revealed main features of sustainability and the vast array of sub issues that relate to each area. As the analysis continued each category was developed to reflect the content of the conversations and draw out more detailed categories within each of the main categories. In developing this process the conversations were analysed repeatedly. A 'Propositional model' was developed from the analysis of the first round of interviews. This illustrates the main features of sustainability emerging from the grounded theory process. Following the analysis of the second round of interviews, an 'Emergent model' of sustainable procurement was developed. The second model acted in two ways. Primarily it sought to add breadth to the model by widening the perspective of views captured. Secondly it sought to confirm the relevance of the features emerging out of the first model.

5.6 A Propositional Model of Sustainable Procurement

5.6.1 Housing Association Interviewees

Interviews were undertaken with three housing association development managers. The housing associations were selected to represent small, medium and large RSLs. The housing agencies categorise RSLs in this way and it was considered relevant to replicate this classification in the data collection to allow existing statistical data to be used if relevant. A housing association owning up to two hundred and fifty properties is considered to be small. In Scotland all other housing associations are classified as large. In England, one owning more than 2,500 properties is considered

a large housing association and any other size of housing association is classified as medium.

The small housing association included in the study is a community based organisation that has operated in a local area since it was established by a group of tenants. The interview was held with the development manager, one of a staff of eight people. The organisation owns and manages four hundred and thirty four properties, most of them within a single community. They have been operating for thirteen years and have been involved in a transformation of the community from a neglected area with low demand for the housing to a popular community with an increasing waiting list. The organisation has been involved in the development of all its properties and has a small development plan.

The medium organisation owns and manages a total of one thousand, three hundred properties and operates within a small city and the surrounding rural communities. The interview was again held with the development manager. The housing association employs a staff of thirty five and incorporates an active tenant participation system for all new and existing developments. The housing association is fifteen years old and has carries out regular development of housing projects. The size of these developments ranges between ten and sixty units.

The large housing association is a part of national housing group operating across the UK with a total of forty five thousand houses. The housing association owns and manages over two thousand properties within Scotland. The Scottish organisation was registered in 1972 and the main group dates back to 1935. The interview was held with the area development manager. This interviewee had moved from another branch of the organisation and brought expertise from several regeneration projects. This housing association procures large numbers of new housing each year and has a well established sustainable development policy.

The aim of choosing the three different types of organisation was to explore similarities and differences between the understanding of sustainability and the way in which the organisations attempted to deliver it through the procurement system. The interviews were all conducted within the offices of each housing association.

5.6.2 Propositional features of sustainability

The open coding process involved extensive analysis of the conversations. Thirteen phenomenon or features emerged from the data. Each of these features is considered separately in the following section to demonstrate the way in which it emerged.

Feature 1: Building standards

Building standards is a key issue with the housing associations. Various constraints appear to frustrate the ability of housing associations to provide the quality of completed product that they aspire to. Several main issues dominated this feature of sustainability - Quality of the housing; National standards; Contractor culture; and Location of property.

Quality of the housing (1.1)

Building standards seemed to have an impact on the level of innovation that was possible in many of their projects. Increasing quality in the housing was a motivating factor in improving the housing.

> *"We try to improve quality, lessen waste and bring innovation through ...site specific innovations are the only thing we really do"....(Int 1)*

This was aim was muted by the underlying pressure from contractors to accept products of a lesser quality.

> *"We specify Nordan windows....more expensive, but better value for money.....they kept trying to get us to go for other ones" (Int 1)*

This development of in-house standards reflected the desire of the housing associations to improve the quality of the housing that they are procuring. The

continued involvement in maintaining the property was a factor in improving the quality of the buildings.

"All double glazed, high performance windows, good insulation. We've got a very high satisfaction" (Int 2)

"The doors....don't survive so we replaced them with solid doors. So now we use solid doors" (Int 1)

The large association was involved in the use of standardisation in components within the house construction. They were achieving scales of economy in purchasing components because of their market position.

"Looking at group strength, getting involved with influence for key products....because it is obviously the more the merrier in some instances. For that you look at paint processes, kitchens, electrical and central heating...." (Int 3)

Each housing association also commented on the demands of the prospective tenants and the impact that this had on the building standards. Tenants are expecting more in terms of space standards and quality of housing. Housing associations are responding to market forces and individual tenant requests in order to maintain demand for their property.

"The aspiration of a single person is to have more than one bedroom....build cost there is very little in it. In terms of the viability of the home and the sustainability of the estate. Communities Scotland...have been very supportive of this view" (Int 3)

"... the existing tenants didn't want any glass in their front doors. And we explained ..... there would be no natural light into the halls. But because the area had such a high crime rate they didn't want glass at all. So we said that's fine, it's your choice" (Int 1)

"A lot of it can be market driven because they are for sale, something like that. Then if you go somewhere like a rural area, especially if it's a remote rural. You're almost doing a sort of bespoke building." (Int 2)

National standards (1.2)

The large housing contractors tend to work with national standards and specifications which prevent innovation and flexibility to respond to the individual needs of a project.

> *"They have their national standards and no matter what we asked for, no matter how simple it seemed to be, it caused them major headaches" (Int 1)*
>
> *"Apart from energy efficiency, heating you just have to go with whatever the standards are" (Int 1)*
>
> *Non traditional build. Still there. incredibly popular community. We're not prepared to look at non traditional build forms in new build, as they did there. I'm not saying they don't have their problems. (Int 3)*

There is a strong influence on building standards from national organisations whether they are the large national housing associations or contractors. The large housing association was more positive to the standardisation of building standards encountered by operating with large contractors.

> *"Volume house builders have a definite say. Standard layouts in terms of stair positions, you know. It's the detailing really that is the most important thing. And they can be adapted architecturally very easily" (Int 3)*

Contractor culture (1.3)

There seemed to be reluctance on the part of the contractor to accommodate change. This appears to be because of procedural difficulties in administering change within their own organisations.

> *"Any changes from the basic standard for them had to go back to their head office to be re-costed" (Int 1)*
>
> *"They like working with us because they are familiar with our basic set of standards. They've got high standards as well" (Int 1)*

Location of property (1.4)

Despite the constraints experienced by the use of building standards, all of the housing association developed new projects with the use of in-house building standards.

> *"We have a series of generic dwelling types. Our own Scottish house types are significantly different to the ones we use down south" (Int 3)*

Innovation appeared to emerge in situations where there was a specific need for an alternative solution. The medium sized organisation admitted that innovation emerged primarily in its rural projects.

> *"in a rural project ....could you install a wood burning stove, because the people are fed up with the electricity... these areas will invariably get cut off." (Int 2)*
>
> *"Somewhere like a rural area....you're almost doing a bespoke building" (Int 2)*

Building standards has an important role to play in delivering improvements through social housing. The experience of previous projects is used to give this learning cycle a focus. National and in-house standards provide a framework for procurement. Barriers to implementing standards exist in various guises. Two of the most dominant barriers are contractor culture (1.3) and location of the property (1.4).

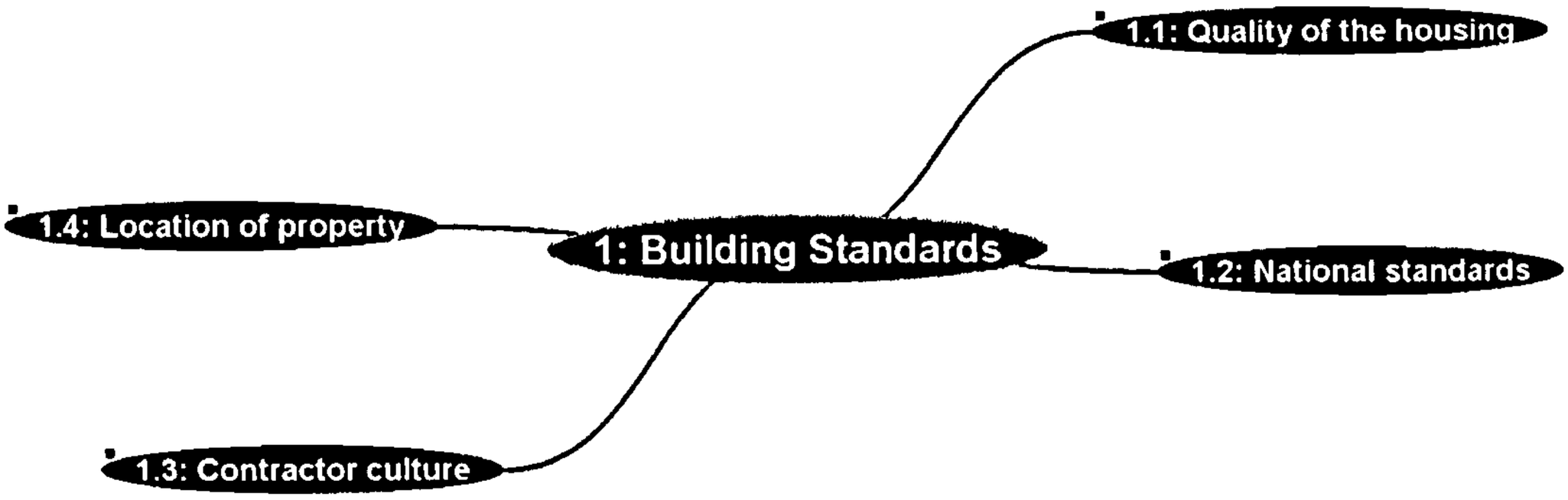


Figure 5-4: Building Standards Model 1

Feature 2: Community facilities

The notion of community was certainly an underlying issue to the housing associations, although it did not dominate any of the discussions. Social cohesion and community were clearly important features of the HAs remit, but perhaps a bi-product of the procurement rather than a central focus.

Community Centre (2.1)

In principle a community centre was considered a positive attribute. The provision of a building alone was not sufficient. To be successful it had to provide a function to the community.

> *"The community centre has been upgraded. That has really helped the area." (Int 1)*
>
> *"We did build a hundred units and that has a community centre but it's not well used. I think it needs a bar or something" (Int 2)*

Capital and revenue costs for community facilities provide a barrier to their provision by HAs with limited financial resources.

> *"We could build a community centre, but where we'd get the money for it." (Int 2)*

Estate management (2.2)

The community based HA suggested that the council expected a wider role of estate management for the entire community. This idea was difficult to accept considering the financial burden it implies.

> *" have suggested that we take on estate management for the whole of [local area], including things like street lighting. Who's going to pay for this? (Int 1)*
>
> *"why should we take on the estate management for the area when the council is still the major landlord" (Int 1)*

The large organisation was evidently involved in larger regeneration projects and had more experience of community wide initiatives.

"....looks at direct service provision.....area based strategies are undertaken" (Int 3)

Development of community (2.3)

The development of community is central to the social housing movement and procurement activity has got to contribute to that wider agenda.

"We've got a couple of courtyards, no front gardens and parking. So we're using the space really well. And they've got their private space out the back. So we do that in terms of social cohesion" (Int 2)

The experience of one association proved that the procurement of housing was contributing to the improvement of communities.

"We started off with no one wanting to live in the area...but now with the better mix of housing and new people moving in.....there is definitely a better feeling in the area" (Int 1)

HA as focus of community (2.4)

HAs have an important role to play in providing a focus to the community and the location of the association has an influence on their ability to perform this role.

"...concerted effort moved off site, it just went back to the same. New houses no cohesion at all. Whereas hopefully Castlemilk you know there is training, bang up to date I.T.....I think there is interest, keeping the local association up to speed" (Int 3)

"We're trying to sustain the community. We don't want to be a developer with a central office. We know that one of our main strengths is that we are small" (Int 1)

The role of community facilities was presented in both positive and negative ways. There was general agreement on the importance of community facilities and the definition encompasses wider role action and practical provision of community space. It is not always feasible to the HAs to provide what is an important benefit.

Figure 5-5: Community Facilities Model 1

Feature 3: Energy efficiency

Energy efficiency was expected to come out very strongly in the conversations because of the dominance of energy efficiency in research relating to sustainable development. The topic seemed to be well bedded within the remit of what the housing associations were doing in terms of development, yet specific mention of energy efficiency was most strongly aligned with fuel poverty (Feature 5).

Heating schemes (3.1)

The HAs have a vested interest in the heating systems used within the housing. District heating and alternative energy sources figured predominantly in medium HAs interview.

> *"That's what got us interested, it was energy efficiency projects" (Int 2)*

Although they showed enthusiasm for integrating energy efficient measures into their projects, there was evidence of resistance from within the procurement team.

> *"This place uses CHP (centralised heating plant)....well it wasn't that straightforward contractually, because they didn't want to put CHP in. Well there wasn't any particular drive for sustainability" (Int 2)*

The choice of heating system was balanced between concern for the environment and the cost efficiency of the system.

"When we're putting in ordinary heating, district heating and CHP. You look at the capital cost and pay back costs. You know the benefits to the environment" (Int 2)

"We decided to go with white meter. Where we put it in small flats it wasn't an issue. ....but they're heating's been a disaster in the refurbished flats" (Int 1)

Reduced energy requirements (3.2)

The small housing association expressed some uncertainty on the delivery of energy efficiency in their projects. There was surprise expressed that their five years old housing stock was considered below acceptable standards.

"we thought we were quite good, within all the standards....they recommended topping up all the insulation" (Int 1)

Focus of activity (3.3)

Tension between the charitable aims of the organisation and the desire to explore innovative solutions in energy efficiency was also referred to as a barrier to incorporating them.

"We've often had this issue of whether we're saving the planet or are we saving someone's fuel bills" (Int 2)

There was concern that they had to be seen delivering on the immediate needs of the tenants as the first priority. Innovation was not always believed to have immediate benefit to the tenants but served more of an egalitarian purpose.

"We're there to help people in difficult circumstances....so we've got to be careful we don't stray too much from it" (Int 2)

"There was a request from SEPA to look at a pond...their first attempt at water treatment and having sewage going into the pond. It was family housing you know. These are things we wouldn't be too keen to look at, but the things that affect our tenants individually, then yes" (Int 1)

Innovative solutions (3.4)

The cost of innovation in terms of energy efficiency was a factor. There was concern about the long term maintenance costs and pay-back costs for any significant capital investment in a system. The investment of time required to implement innovation was seen as a negative aspect of innovation.

> *"I think a lot of people will be interested in the capital costs and long term maintenance costs of energy efficient systems" (Int 2)*
>
> *"photovoltaics and chp....they're loss leaders. Heavy on management time..." (Int 2)*

Energy efficiency is an integral part of the procurement of social housing. Most of the measures implemented under the title of energy efficiency are standard solutions. Where innovation has been introduced, the HA has found the experience resource intensive.

Figure 5-6: Energy efficiency Model 1

Feature 4: Feedback

Tenant feedback was clearly a predominant issue with all of the HAs. It appeared to be an integral part of the procurement cycle and was used to establish improvements for later phases of development or future projects.

Occupancy feedback (4.1)

Tenants were asked for post occupancy feedback. This seemed to be an ongoing process to determine the satisfaction level with the housing. This happened at

optimum intervals - the weeks following occupation and at the end of a year to coincide with the end of the defects liability period.

> *"Four to six weeks after moving in we ask them about the quality of the house" (Int 1)*
>
> *"At the end of the defects period we ask them again what they thought" (Int 1)*
>
> *"There's tenant focus groups.....we do things like tenant satisfaction surveys." (Int 2)*

Development cycle (4.2)

Involving tenants in the procurement of new housing is an integral part of meeting the demands of the prospective tenants. This is an important aspect of the continuous improvement cycle called for through the social housing agencies.

> *"So there has really been something that has come out of tenant feedback.....to feed back into later development phases" (Int 1)*
>
> *The tendency to get more feedback when projects have failings can have serious impact on associations and the way in which their development work is operated.*
>
> *"And politics play a part in it as well. Particularly the bad bits.....Its a minefield" (Int 3)*

Tenant groups (4.3)

Tenant groups have are integral to the social housing sector. Active tenant participation is often focused from tenant groups. They can act as useful conduits of information, feeding into and out of the procurement process.

> *"there are a couple of different tenant groups...we do keep them informed" (Int 2)*

Groups are sought after by tenants and the HAs. Motivation to establish a tenant group may come from either party which will depend on what is to be gained by involvement.

"our tenants approached us last year about setting up a tenants group" (Int 1)

"...try and get a few folk from a scheme who are interested in attending more meetings" (Int 2)

Lack of engagement (4.4)

When projects were successful it was much more difficult to get tenants involved in providing feedback. Tenants were not motivated unless there was cause to complain.

"It's very difficult to get people interested in it. The real drive is when people are living in appalling conditions" (Int 2)

"It's easier on regeneration schemes. Our consultation schemes for areas that are not regeneration and people are quite happy. Trying to get them involved is actually very difficult" (Int 3)

Feedback constitutes an important flow of information between the HAs and their tenants. It can be used for the procurement of future projects to aid continuous improvement to the way in which the houses are designed.

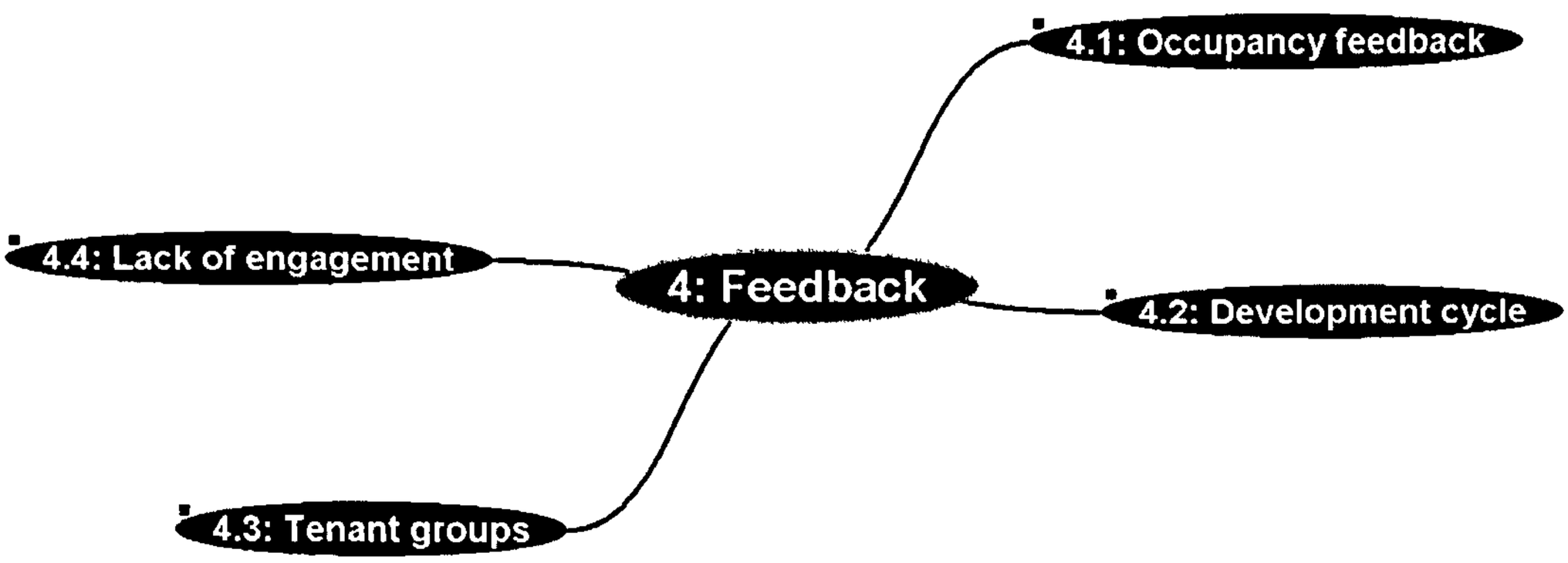


Figure 5-7: Feedback Model 1

Feature 5: Fuel poverty

Eradicating fuel poverty is one of the key drivers of the housing agencies. The UK government has committed to reducing households living in fuel poverty and the housing agencies have made it one of their key goals. 'Fuel poverty' occurs when a household's heating costs are unaffordable. It appears to be a central concern of the housing associations.

Cost of heating (5.1)

There was an issue of balancing the environmental pressures of development with the individual economic and social pressures of affordable heating for the tenants. This view was expressed by the medium housing association in response to a discussion on energy efficient innovations.

> *"We had this issue about whether we're saving the planet or are we saving someone's fuel bills" (Int 2)*

The driver to move towards energy efficiency was the 'fuel poverty' experienced by many tenants.

> *"..it was energy efficient projects, which I suppose was because of fuel poverty. So I suppose that is where we came from" (Int 2)*

Concern for the financial pressures faced by tenants in housing emerged as a feature for all of the housing associations. There was acknowledgement of the influence that heating costs had on the quality of life experienced by tenants.

> *"We don't monitor it. We were really shocked at the cost some folk were facing" (Int 2)*

> *"but if they were unfortunate enough to have 'total heating-total control' in a house with poor insulation then it is very hard" (Int 2)*

Installation, maintenance and running costs were significant in the choice of heating system. There is some uncertainty expressed in the choice and efficiency of systems available and some evidence of the failure of certain types of heating.

> *"...decided to go with white meter. We asked for more information and proof that it wasn't going to be more costly than gas heating" (Int 1)*

"We refurbished under the same contract and their heating has been a disaster in the refurbished flats" (Int 1)

It was clear that there was inadequate advice or knowledge on the best form of heating system in respect of the way in which tenants heated their houses.

Condensation (5.2)

The physical effects of fuel poverty on the property manifest themselves in water damage. Dampness and condensation can cause significant long term damage to properties. Tenants were not heating their properties because of a fear of heating costs. As a result, relatively new projects with reasonable levels of insulation were deteriorating.

"People aren't using them [heaters] and they're scared at how much it will cost and ended up with condensation despite the hundreds of thousands we've spent on them" (Int 1)

Damage to the property results in additional maintenance costs, and a reduction in the quality of life experienced by the tenants.

"... ended up getting water coming in to her house because of condensation problem" (Int 2)

"I think the chimneys are too damp, because of maintenance" (Int 2)

Fuel poverty impacts on the quality of life of households. It also influences the long term maintenance and the viability of property. Fuel poverty is a central issue to the procurement of social housing in terms of social, economic and environmental sustainability and represents an overarching issue for the sector.

Figure 5-8: Fuel Poverty Model 1

Feature 6: Funding

The housing associations were aware of the impact funding decisions had on their ability to provide innovative solutions within their housing projects.

Lowest cost (6.1)

Frustration at the inability of some parties to move away from the tendency to choose lowest cost option was expressed. This feature of procurement seemed to be relevant to the competition culture that is a prominent feature of the housing association procurement process.

> *"...its bottom line all the time, everytime. They're shocking. And I've had huge arguments with them [discussing one of the large councils]" (Int 3)*
>
> *"But we were beaten down on cost and they'll have to come out." (Int 2)*

Competition in the procurement process was believed to bring benefits. Traditional competition was not favoured. A vision of competitive HAs combined with competitive contractors was held by the large organisation.

> *"...but competition is hopeless. It drives everything down to the lowest common denominator" (Int 3)*
>
> *"..the HA that would be most competitive and then marry up with the developer that is the most competitive....best of both worlds" (Int 3)*

Political pressures (6.2)

There was some evidence that funding for projects was directed at politically sensitive areas. This seemed to contradict the allocation of funding based on the measure of sustainability which is being put across by the housing agencies.

> *"..with all the political pressures. You see that now with places that are under-funded. But if its Craigmiller, "you need another five million quid?" and its, "oh sure" (Int 3)*

Involvement of housing associations in extra-curricular activity was seemingly encouraged by the housing agency. Provision of services beyond housing reflected well on organisations that were able to combine this with developing and managing

housing for tenants. Extra-curricular activity ranged from assisting tenants with housing benefit applications to providing community centres within housing projects. There was some concern about how and if these activities could be funded.

> *"Scottish Homes assumes that if you are a good association....then you should be looking at all community involvement, but there will be no extra funds." (Int 1)*

Innovation (6.3)

Funding of innovation was difficult to achieve through the procurement system. It was seen as costly and time consuming. The additional benefits of the innovation itself were difficult to balance against the increased capital investment required.

Performance benchmarking was in practice by the large organisation. Improvements within housing had to be measured within set targets and standards.

> *"We want to set standard benchmarks so we can compare performance, costs across the group" (Int 3)*

Pay back costs (6.4)

Consideration of maintenance and running costs in the decision making process was apparent, yet there was not necessarily support from the funding agencies in term of financial backing. There was a clear dichotomy between the cost of a particular solution and the environmental benefits that it had.

> *"You look at the capital costs and pay back costs. You know the benefit to the environment"*
>
> *"We're looking at district heating systems at the moment. If you put in gas boilers.....you've got, oh sixty quid per year per house.....So there's a huge cost every year....so it doesn't take rocket science"*

There is still has a strong bias towards lowest cost in funding for projects even with the introduction of 'best value' principles into public sector procurement. Allocation of funding is politically driven and large amounts of investment are being made

available for the most deprived areas. Long term consideration is of running costs are evident, but it appears to focus on a very literal calculation of cost rather than social and environmental benefits.

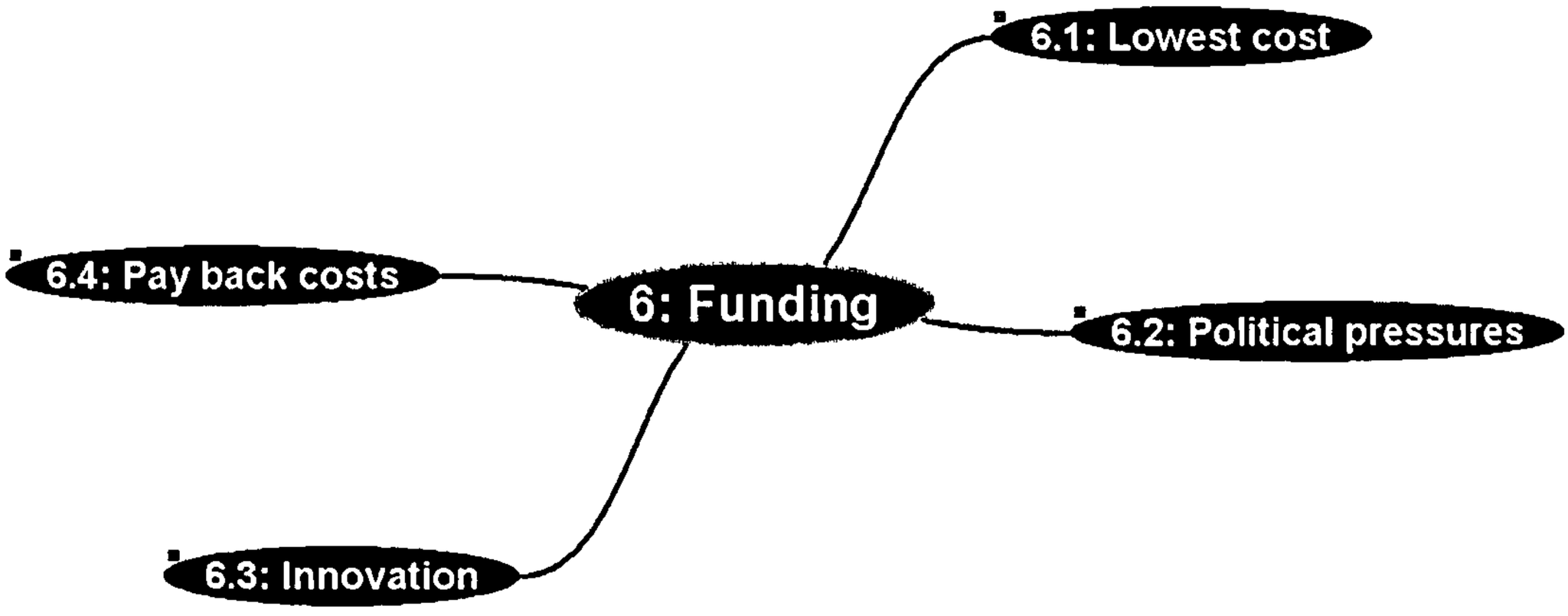


Figure 5-9: Funding Model 1

Feature 7: Insulation

Insulation was not mentioned frequently in any of the interviews specifically. There was indirect reference to insulation with regard to improving thermal performance of the housing and increasing the efficiency of heating systems. This does not necessarily reduce the importance of this feature of sustainability. It perhaps implies the implicit nature of insulation to the concept of sustainability in the procurement process.

High levels of insulation (7.1)

Insulation forms an integral part of many sections of the interviews. It is referred to as an inherent part of the procurement of social housing. Increased insulation levels are considered standard appeared the least demanding way for the HAs to address sustainability issues.

> *"...cant afford to pay high heating costs. You need good insulation" (Int 1)*
>
> *"They have their problems as well in terms of insulation" (Int 3)*

"all double glazed, high performance windows, good insulation" (Int 2)

"...they recommended topping up the loft insulation... I think we're going to find that these things are always going to be an issue for us" (Int 1)

SAP rating required (7.2)

Building regulation standards determine the level of heat loss permissible. The social housing sector is leading the way in delivering houses that have a better thermal performance than is required in the building regulations. This results in a normal standard that is in excess of the requirements. This small improvement in the standards has resulted changes to insulation levels and heating installations. It appears that this is happening because it required rather than based on choice.

"You put in gas boilers because of the SAP factor that you need" (Int 1)

"...you just have to go with what the standards are" (Int 1)

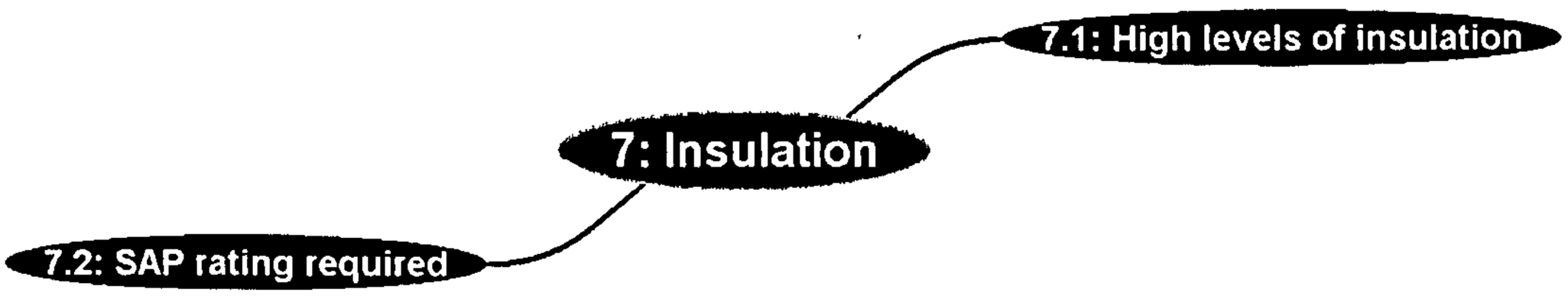


Figure 5-10: Insulation Model 1

Feature 8: Involving tenants

Tenant involvement in the procurement process is an important feature to all the interviewed housing associations. All three associations made statements of the intrinsic nature of involving tenants in the procurement process.

Engaging with people (8.1)

The value of incorporating the views of tenants in the procurement system is an underlying feature of social housing.

"Regeneration schemes, new build, rehab. Then obviously we have to engage directly with the people" (Int 3)

" see what needs to change. What's required and how people want help" (Int 1)

"And it is working with. You know it's not a rigid issue, something that will change depending on the environment you are working in" (Int 3)

These comments reflect the evolving nature of sustainability experienced through the procurement system. It acknowledges the need to engage individuals and capture their views.

Responding to need (8.2)

The experience of developing for existing tenants was generally positive and resulted in a better housing product. The social housing sector is able to respond to the specific requirements of their tenants by involving them in the procurement of the housing. Experience shows that this can be a very rewarding experience.

"The architect sat with each tenant and discussed the needs of the tenant" (Int 1)

"The tenants were already here. They were able to tell us what they wanted" (Int 1)

"we're there to help people in difficult circumstances" (Int 2)

Matching aspirations (8.3)

The aspirational aspect of sustainability is defined as "improving the quality of life". Housing is a clear indicator of quality of life and the matching the aspirations of tenants is a measure of how successful that housing is.

"Whatever you're doing it has to match the aspirations of the people you are working with." (Int 3)

Developing speculatively for tenants from a waiting list was necessary in many cases, where the specific tenants were not yet allocated. This resulted in an inability to respond to specific tenant needs.

"We don't develop on spec for our tenants. We're not a co-op" (Int 2)

Failure to involve tenants (8.4)

Tenant involvement seemed important to allow the procurement process to respond to the changing environment of sustainability in the built environment. One case of insufficient tenant involvement had resulted in significant sums of money being required for retrospective changes to new housing.

> *"....half a million work in changes. So at Garthumlock....hold on a minute lets double check. In terms of each tenant, a few days work. It was about one hundred and sixty thousand pounds." (Int 3)*

Continued involvement (8.5)

The continued support of the housing association seemed to be an important factor in keeping tenants involved in the social integration of housing projects. The experience of the large association, which did not maintain local offices within communities, was that the social fabric of the depended on support from the HA.

> *"..when the local office closed and all that concerted effort moved off site. It just went back to the same again. New houses but no social cohesion." (Int3)*
>
> *"two or three weeks after moving in they have an evening, just to let them know who lives in the stair...." (Int 2)*

Involving tenants is an integral part of the social housing sector and is important to the delivery of housing that responds to 'customers' demand.

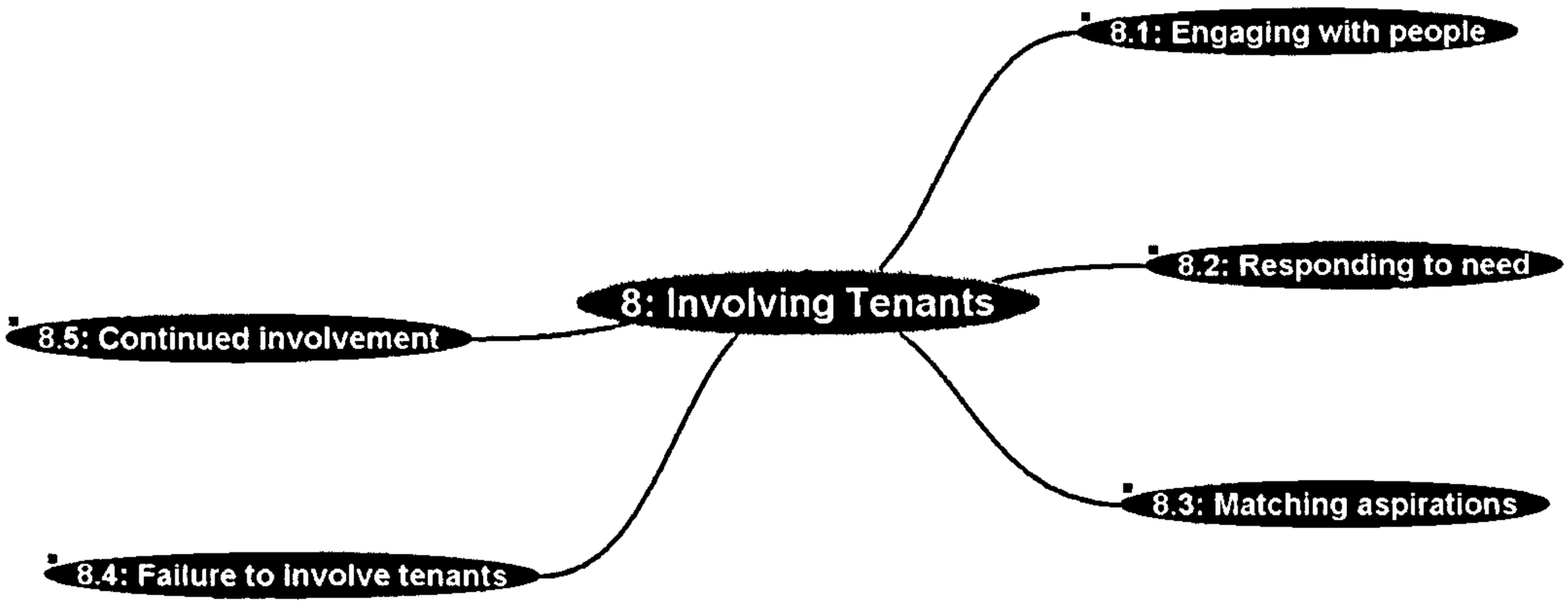


Figure 5-11: Involving tenants Model 1

Feature 9: Maintenance

H.A.s generally have a long term interest in the property. Maintenance issues are usually considered within the procurement of social housing as an important decision aid.

Repair of property (9.1)

The associations all put emphasis on the need for tenants to be able to access maintenance staff. The middle sized organisation provided a full time contact number to its tenants and looked on this with a sense of pride.

> *"we have a guy with a phone with a staff at 24 hours. All sorts of, so we do provide an incredibly good service" (Int 2)*

Maintenance free (9.2)

The desire for 'maintenance free' components was important to the small association and they admitted that this was their impression of what sustainability meant.

> *"The only thing we are really doing is we started putting in the design brief that things should be maintenance free. I don't know if that's sustainability, but for us it's the long term life of things". (Int 1)*
> *"...ten year guarantee on the windows before you have to paint them. That really helped us" (Int 1)*

Community wide initiatives (9.3)

The small association reflected on the effect that lack of maintenance was having on an adjacent housing estate with a high percentage of owner occupiers. This was perceived as a problem for the long term management issues of the housing.

> *"...most of it is privately rented, its not maintained. Estate management is an issue"*
> *"Nothing to do with us but part of our community, so we put in a bid to employ someone to work with a local group..... carry out decoration for low income or elderly and during the summer they do gardening." (Int 1)*

Maintenance incorporates the seemingly opposite concepts of maintenance free and repair of properties. The desire for components that will last is referred to as maintenance free but implies an element of increased quality. This has a positive contribution to reducing the need for repair. The management of repair and maintenance for individual properties and whole communities was an important aspect to maintaining pride in the community.

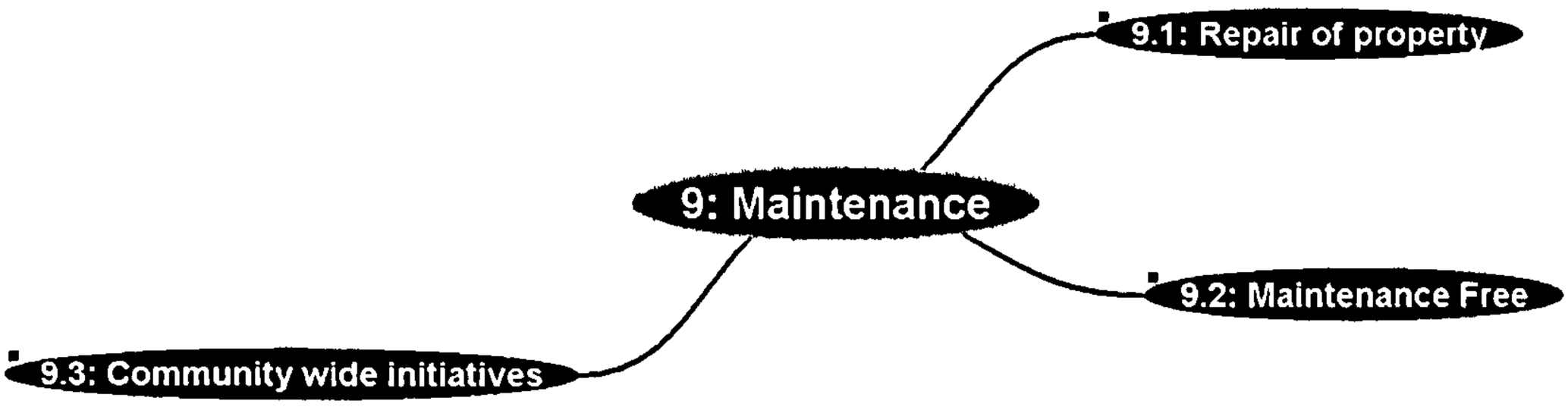


Figure 5-12: Maintenance Model 1

Feature 10: Mixed developments

Incorporation of amenities within a community was viewed as important to the overall success of an area. Lack of amenity is thought to be a contributing factor to unsustainable communities.

Integration with neighbourhoods (10.1)

Social housing projects are most commonly constructed within existing neighbourhoods. The housing benefits from the existing features of the community.

> *"...its not just new housing. The community centre has been upgraded...so that will bring another change to the area" (Int 1)*

Retail units (10.2)

Provision of shops close to housing is important socially. Although usually completely independent from the housing project, it is a vital support to tenants and is a consideration in the sustainability of the housing.

> *"The local shopping is better, not great, but a lot better than it was" (Int 1)*

Diversity of neighbourhood (10.3)

Neighbourhoods have evolved to represent the demographics of the population. Owner occupiers often prefer under occupation that encourages the use of housing for home working in an ad-hoc manner.

> *"Sometimes with shared ownership they might under occupy and use the room as an office" (Int 2)*

Workspaces in housing (10.4)

The integration of working units was considered favourably by the medium sized organisation. They considered the idea a good way of developing the community through the housing projects. However they did acknowledge that there is a much wider set of issues impacting on the success of workspaces within houses or the community.

> *"We like the idea of having workspaces...but people on low income...their employer doesn't tend to let them do it [work at home]. There's no need for it, which is a shame" (Int 2)*

The social fabric of a community comprises more than the housing. Development that complements housing provides an important social and economic support to a community, vital to maintain its sustainability.

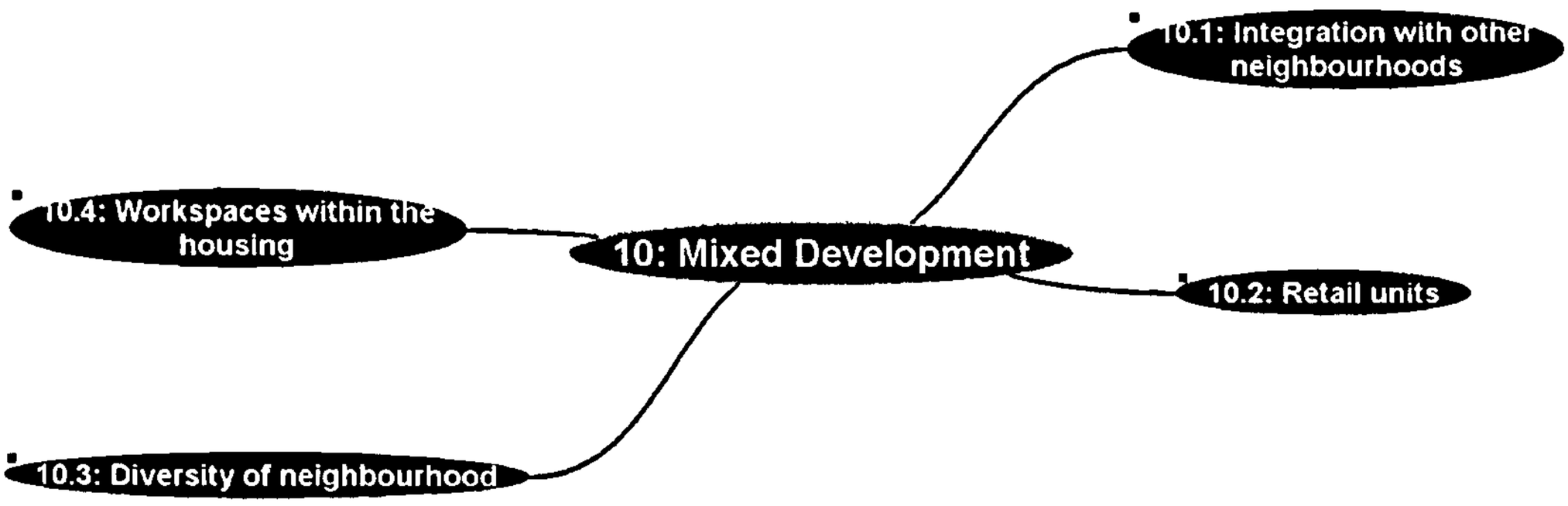


Figure 5-13: Mixed developments Model 1

Feature 11: Mixed tenure

Providing a mix of housing types has been part of housing policy for a number of years. It has been strongly associated with the social sustainability of a community.

Waiting lists (11.1)

The housing associations all referred to the need for developments to respond to the existing or proposed tenant mix. The use of waiting lists was clearly used as a tool for planning tenure mix. This was used with varying degrees of success, with the large housing association providing evidence of the failure of this method of projecting the likely tenant mix.

> *"Looking at the waiting list and ....forty percent people wanting a three bed house, fifty percent wanting one bedroom" (Int 2)*
>
> *"It was based on waiting lists.....take what you get given at face value then you are on a hiding to nothing. So we took a view and the council co-operated.....so theres a lot less flats and more houses. It costs, you know." (Int 3)*

Social integration (11.2)

The changing tenure of housing association properties has provided a catalyst for significant improvement in the social wellbeing of previously deprived areas. Areas which had previously been avoided by tenants are now benefiting from a more sustainable tenant mix that has improved the social balance of the community. This has been possible through the provision of suitable housing types.

> *"People have been dumped in the area. But now with a better mix of housing and new people moving, and owner occupiers, there is definitely a better feeling in the area"*

Existing communities (11.3)

The logic of maintaining the integrity of existing communities is acknowledged for regeneration projects. Recognising the validity of local knowledge for procurement is an important feature.

"So again if we can keep that community together, not spread them across the whole estate.....Identifying priorities within the community and trying to keep the best bits together. Not just destroying it in terms of when you are involved in large scale redevelopments, being sensitive to local needs." (Int 3)

Shared ownership (11.4)

The integration of owner occupiers or shared ownership units into the overall landscape of social housing developments has been generally positive.

> *"..a new park ....so that should sort of merge the two communities together. That should sort of help" (Int 1)*
>
> *"...only a dozen of them will be shared ownership. So we do tend to hold on to our assets" (Int 2)*

Size of units (11.5)

Providing the appropriate size of unit to match the housing demand is a problem for HAs. There is a chance that the housing configurations may not reflect the tenant profile.

> *"You don't want to end up with a huge number of large houses. .if youre not going to be able to let them" (Int 3)*

Impact from consumer demand was apparent in the changing aspirations of tenants. This was marked by the increasing frequency of shared ownership tenure within housing associations.

> *"We know that the people buying the houses want to under occupy. They want a spare bedroom. That's a luxury they're buying" (Int 2)*

Mixed tenure is an accepted feature of social housing. Integration of different sized units, and shared ownership increases the diversity of a community. Incorporating an appropriate range of property into a housing project is an important consideration for all new projects.

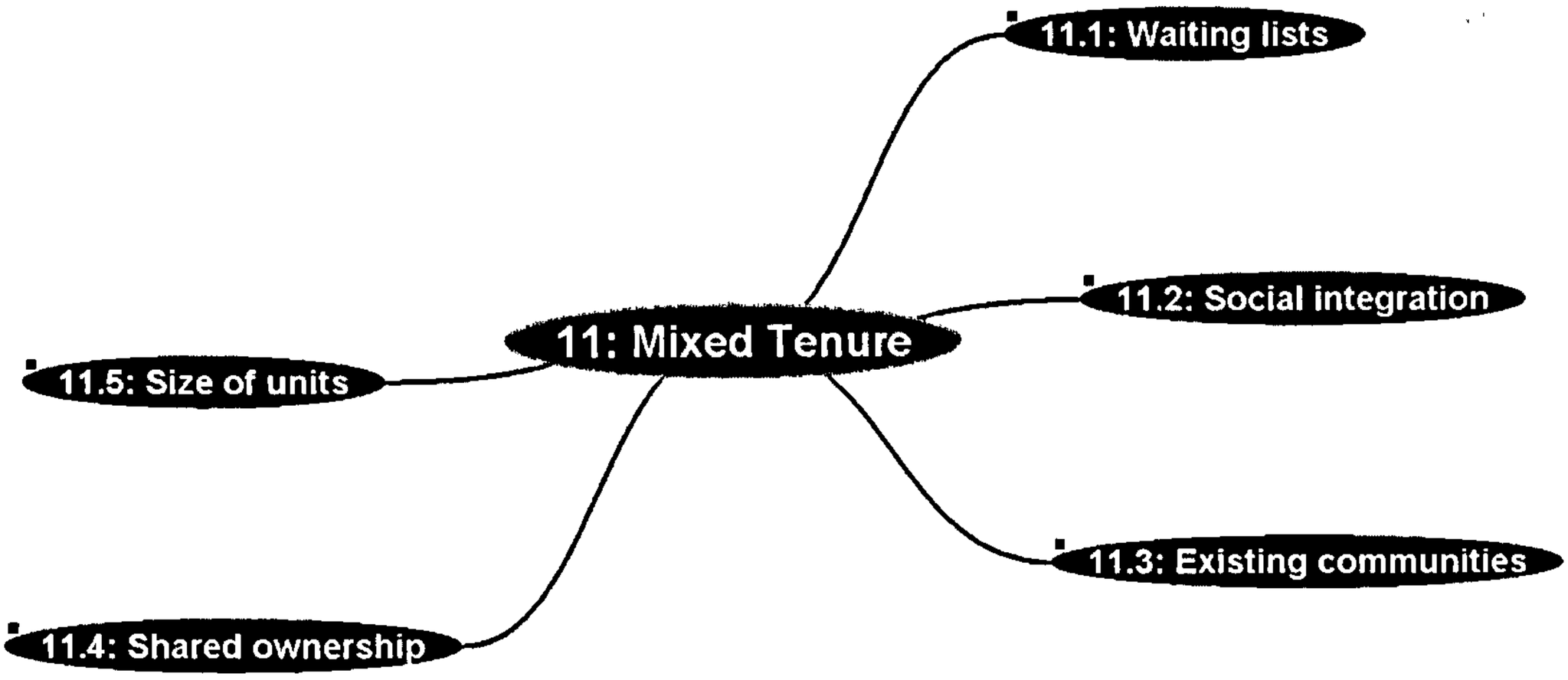


Figure 5-14: Mixed tenure Model 1

Feature 12: Quality of specification

Specification of housing has a major influence on sustainability. The materials, innovation in design, energy efficiency of systems and components and the involvement of tenants in its development are all integral features of the specification.

Choice of materials (12.1)

The representative of the large association considered many associations to be guilty of over specifying on the grounds of sustainability. There seemed to be an imbalance between the longevity of the materials and components and the cost implications.

> *"...some of the Scottish housing associations tend to be over the top specified anyway" (Int 3)*
>
> *"There may be sustainability issues, long term maintenance, but I would suggest that was maybe taking it too far [on specification of brass ironmongery and maple flooring]" (Int 3)*

The small organisation was concerned with improving their specifications. They had recently upgraded the doors they specify. They considered maintenance to be a problem avoided where possible.

"The only thing that we are doing....putting in the design brief that things should be maintenance free" (Int 1)

Innovation in the design (12.2)

There did not seem to be adequate support from housing authorities and the sector in general to implement innovation in the specification of housing. Lack of encouragement to try different solutions was not forthcoming, even where there was evidence that projects in the past had succeeded in producing innovative housing that is still popular and could be considered socially sustainable.

"I mean you deal with them as an organisation and they'll be saying all the right things....down at a lower level?.....yes, they're shocking" (Int 3)

"We're not prepared to look at non traditional build forms in new build, as they did there. They have their problems as well in terms of insulation, but hey, that was an answer then" (Int 3)

Energy efficiency (12.3)

Components are often selected because of their low energy credentials. The main feature of energy efficiency was evident in the feature of specification. This was achieved by the choice of products that either reduced energy use in the occupation of the housing, or in its production.

"Generally far higher standards of energy efficiency and the quality of the product [talking about standard house types]" (Int 3)

"All double glazed, high performance windows" (Int 1)

Tenant involvement (12.4)

Where the specification had been agreed with tenants prior to construction, there was success reported in low turnover of housing which indicates a high degree of tenant satisfaction with the properties.

"The architect sat with each tenant and discussed the needs of the tenant ...very low turnover because the tenants had a good say in the design of the houses" (Int 1)

Every decision relating to specification has an impact on the sustainability of housing. There was a mixed opinion on the way in which sustainability can be achieved. The appropriate choice of materials with better quality and long life expectancy was subject to a value judgement and clear guidance on the 'correct' approach is not available.

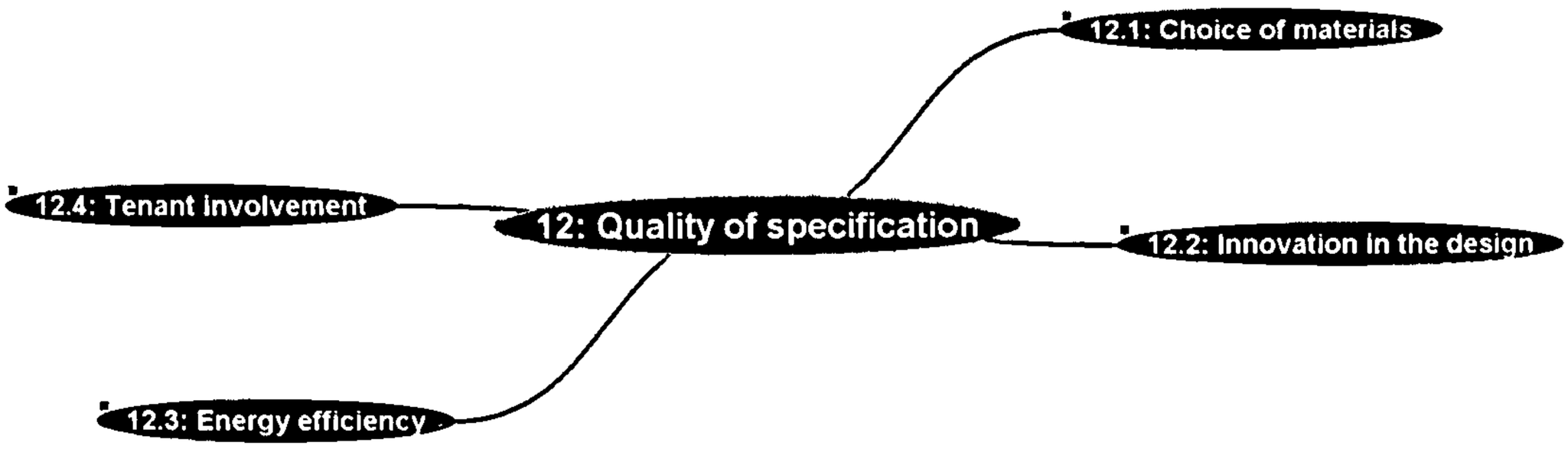


Figure 5-15: Quality of specification Model 1

Feature 13: Rent levels

Acknowledgement was made that social housing tenants could not afford high rents. However, they were able to get assistance from housing benefit to supplement or pay their rent in full, depending on their circumstance. Housing benefit is paid to X% of social housing tenants. There remain a high percentage of tenants that are financially burdened by some or all of their rent.

Income levels for association (13.1)

Housing associations are non-profit organisations. Their revenue is to sustain the organisation and its activities. In some situations there was concern that housing associations were being expected to carry out a function that was the remit of the council. The small association operated in an area in close proximity to council owned stock, but because they were based locally there was some expectation that they would carry out an estate management role. They also felt obliged to provide

some assistance to owner occupiers in the area to maintain a good quality built environment.

> *".... they're not paying rent for something that council tax should be covering" (Int 2)*
>
> *"the more services we provide, the higher the rents" (Int 1)*

Affordability (13.2)

In general the rent levels are of less concern to tenants than

> *"You know your tenants are on the whole quite poor, they can't afford to pay high costs" (Int 1)*
>
> *"If the rent was high, they could get plenty of help on a sliding scale, but if they were unfortunate" (Int 2)*

Rent levels are regulated by local authorities. Housing associations are prevented from increasing rents above market levels. This has an impact on the income stream of the organisations and affects the ability of associations to carry out development programmes.

Figure 5-16: Rent levels Model 1

5.6.3 The Propositional Model

To gain a better understanding of the perception of sustainability for the social housing sector the analysis aimed at identifying the aspects of sustainability that were important to the procurement process. Figure 5.17 represents the aspects of sustainability that emerged from the conversations.

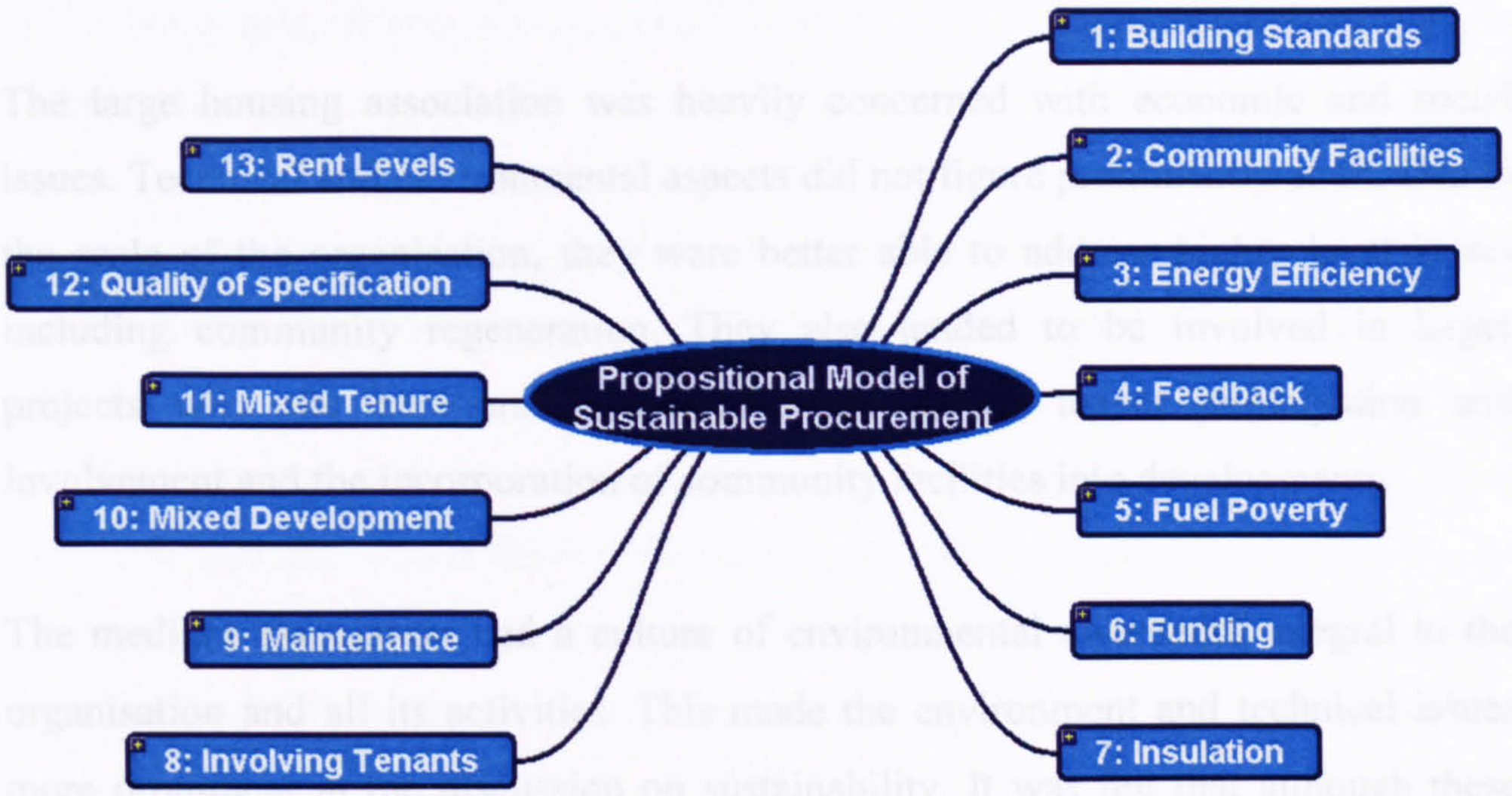


Figure 5-17: Propositional Model 1 – Features of Sustainable Procurement

5.6.4 Reflection on propositional model

The interviewees had some different perceptions within the procurement process and this confirmed that they would hold significantly different views on sustainability. Analysis confirmed the distinct positions held by the three groups and the context in which they understood sustainability. However, understanding of the general concept of sustainability was reasonably consistent with all the interviewees.

The initial analysis sought to establish the extent that each housing association considered sustainability within their procurement process. There was a good level of general awareness of sustainability with the housing associations involved in the study. Sustainability is a term that all the housing associations were clearly familiar with. The large housing association, part of a national group has a fully developed and implemented sustainable development policy. The middle-sized housing association was involved in several high profile "sustainable" housing projects. The smallest housing association admitted very little activity in terms of sustainability and hence a poor understanding of the term.

The large housing association was heavily concerned with economic and social issues. Technical and environmental aspects did not figure prominently at all. Due to the scale of the organisation, they were better able to address higher level issues including community regeneration. They also tended to be involved in larger projects with the additional resources available for tenant participation and involvement and the incorporation of community facilities into developments.

The medium association had a culture of environmental awareness integral to the organisation and all its activities. This made the environment and technical issues more prominent in the discussion on sustainability. It was felt that although these projects were important they required a vast amount of time to manage and they were not always financially viable. Sustainability was aligned very closely with the environment and community issues were considered to be less to do with sustainability.

The small association considered that it had carried out very little activity that could be considered sustainable. However it emerged throughout the conversation that a lot of the activity that housing associations carry out in "normal practice" was considered sustainable and housing associations had been doing this for many years before the funding bodies adopted the term.

> *"I think housing associations have always had sustainability in mind, maybe not had a label on it" (Int 1)*
> *"A lot of associations have been doing it and never being recognised for it and along come other associations and get a gold star" (Int 1)*

The perception of sustainability held by the small association was primarily concerned with technical issues and economic issues, particularly fuel poverty.

Wider community issues were also clearly important to, although outside the remit of the association.

The interviews revealed three different perspectives from the housing associations involved in the study. However a common theme ran through the conversations held with all of the associations. There was a belief that social housing endeavours were sustainable by the very nature of housing association activity and purpose and that a long term approach was at the core of housing association activity.

> *"A lot of the things we're doing just now, quite frankly Scottish Special did 30 years ago" (Int 3)*

The propositional model generated by the first round of interviews presented thirteen features that illustrated the most important elements of sustainability to the housing associations in the procurement of social housing projects. These thirteen features contained within the propositional model provided the analytical framework for the subsequent set of interviews. This round of data collection was intended to increase the theoretical sensitivity of the findings (Glaser 2001). This has the aim of broadening the understanding within each feature and confirming concepts that have emerged for their relevance to the overall grounded theory.

5.7 An Emergent Model of Sustainable Procurement

5.7.1 Consultant Interviews

Interviews were held with consultants involved in the procurement of social housing. The interviewees were two architects and the sustainable development director with the Scottish housing agency, Communities Scotland. Their experience provided a rich source of information on sustainability issues in the procurement of social housing.

Both architects worked in private practice, fulfilling the role of designer and project manager for housing association clients. Each has been involved in social housing procurement for lengthy periods, thirty years in one case and their experience was evident in the data collected through the interviews. In both cases, the architects had worked with several housing associations repeatedly, building up a strong relationship with these organisations.

The representative of the housing agency was centrally based and was instrumental in the development of the 'Sustainable Development Policy' (Communities Scotland 2003) for the Scottish social housing sector. The interview provided a policy perspective on sustainability that provided some contextual background to the emerging grounded theory.

5.7.2 Emergent Features of Sustainability

The thirteen features of sustainability that comprise the propositional model of sustainability developed from the first round of interviews form the basis of the emergent model of sustainability. This model is developed following the analysis of the second round of interviews. The interviews were analysed based on the coding framework from the propositional model. This iterative process produces features grounded in practice. Analysis of the conversations sought to confirm the main features of sustainability and explore any additional emerging features. The following sections presents the practice based features of sustainability.

Feature 1: Building standards

The four sub-categories generated in the propositional model were confirmed through the conversations held with consultants. Each feature was enriched with further issues that increased the breadth of understanding. This in turn reinforced the concept.

Quality of the housing (1.1)

Provision of good quality housing emerged as a fundamental feature of the procurement process. It was considered an underlying theme by both architect and the housing agency representative.

> *"And I like to provide a very good basic house that has a high built in quality, rather than fancy gable features or architectural features" (Int 4)*
>
> *"generally they do prefer the money spent on the quality of the product" (Int 4)*

The housing agency representative considered quality as an integral part of sustainable development.

> *"revisiting the housing quality assessment program..... It will probably require us to revisit the basic principles of the sustainable housing development and what they mean" (Int 6)*

The interview held with the housing agency representative revealed another perspective on the procurement system. There is a drive to implement programme funding for housing associations and the interviewee expressed some reticence on the ability for this process to deliver higher quality housing as opposed to project by project development.

> *"How do you know.....thinking about a programme rather than individual projects, that you are necessarily going to get the added quality. Or the added quality won't actually cost more money." (Int 6)*

National standards (1.2)

The standards being set by private developers were contrary to the standards the social housing sector are aspiring to. One architect believed that people were not made aware of the poor quality they were getting in some private housing.

> *"we can't get the private housing people to be interested in the slightest..... I think its completely untrue that the private house builders say that people only pay for what they are given. They are never offered anything else" (Int 4)*

Contractor culture (1.3)

Resistance to change is something experienced in dealing with contractors. There is generally poor engagement with sustainability issues. When it comes to putting them into practice, contractors are often making decisions on a financial basis.

> *"I think regulations are quite useful, because it makes people who don't want to do things, have to do things" (Int 4)*
>
> *"Contractors have learnt a lot about sustainability...waste and managing landfill...but they still would be happy to swap anything that was a good product for a cheap product." (Int 5)*
>
> *"It happens terribly with design and build" (Int 4)*

Transfer of information and knowledge throughout the contractors organisation also revealed itself as an issue. Decisions made with high level staff at an early stage were not always transferred to the site based staff, given the task of procuring materials and finalising details.

> *"They're very good at the early stages....but when you get on site you seem to go back to the old traditional ways. The people on site rarely know what's gone on before" (Int 4)*

Location of property (1.4)

The location of housing developments has a strong influence on the procurement. The high density of urban sites contrasts markedly with the requirements of a rural site. Local economic and social factors have a significant bearing on the design of social housing depending on where it is to be constructed.

> *"Five hundred houses, keeping the same number of houses which they've always had. But it would have to be quite a dense community. Quite an urban area, obviously it's right on the edge of a city" (Int 4)*
>
> *"We've said that it's a flexible framework and it has to reflect the local circumstances and the fact that you know, in the Western Isles the economy is more fragile and you would potentially destabilise that if you made a commitment, you know in writing for five" (Int 6)*

Quality is a key driver for improvement of building standards in social housing and it is thought to exceed the standards of much private development. Contractors are not taking the lead on sustainability and often seem to reject the principles in favour of their own standards. The consultants were in a frustrating position of having to deal with this while attempting to deliver sustainability through the procurement process.

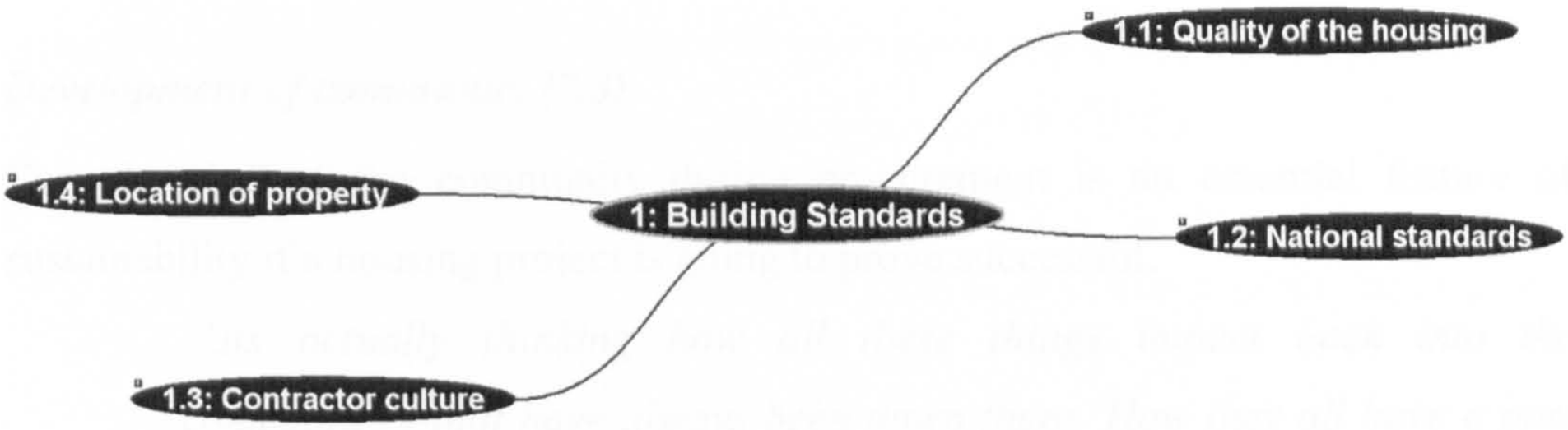


Figure 5-18: Building Standards Model 2

Feature 2: Community facilities

It was assumed that the consultants would be less concerned with the wider issue of community. Contrary to this assumption, they were acutely aware of the importance of community, presumably because of their long involvement with the social housing.

Community Centre (2.1)

There was evidence that procurement of new buildings was not always necessary to provide community facilities to support the housing projects. The aspirations of tenants were a strong feature of demand for a new facility.

> *"Community groups, come to us they want a new community centre…whats wrong with the old one. You just need a rethink" (Int 5)*

Estate management (2.2)

The housing agency representative referred to small grants to assist housing agencies to take on wider roles in the community.

> *"But the expectation there was that housing associations would be encouraged through seedcorn grant, basically, to take on different activities rather than procuring, managing and maintaining their housing stock. Some associations had already shown a willingness to do this in advance of that initiative." (Int 6)*

Development of community (2.3)

Consideration of the community during procurement is an essential feature of sustainability if a housing project is going to prove successful.

> *"Its actually thinking how all these things impact back into the communities that have always been down there. How they all have a part of it" (Int 4)*

One of the consultants with many years of involvement in social housing made a very strong statement on the ability of housing to solve the problems of society. The suggestion is that housing is only one part of a complex social system.

> *"you cant change everything, you cant change the unemployment.....people must never make that mistake that housing can change everything"(Int 4)*

HA as focus of community (2.4)

The involvement of the HA in the community was again perceived as a positive factor in the development of social housing.

> *"Not all housing associations are community based. Where they are they are very beneficial. They are vehicles for change" (Int 5)*
> *"they're the locally based associations, that will have a presence in the high street" (Int 6)*

Retail and community facilities (2.5)

There was a feeling that HAs are expected to be involved with projects over and above housing. This was being instigated by the delivery of grant to assist in the development of initiatives that supplemented the main activity of housing development.

> *"…. looking at a central area and how the doctors surgery and the chemist and the shops….so its working with all the agencies" (Int 4)*

Incorporation of other community facilities within housing association areas was seemed to be a more common theme in larger regeneration projects. It involved the coordination of the HA with other agencies in a concerted effort to gain funding and push the project along.

> *"there is some creative thinking on how to pull in a doctors surgery and their money….to do other things" (Int 4)*

Community facilities were perceived as an essential catalyst for community sustainability. The housing was not thought to be enough to deliver sustainability on its own. It formed an integral part of a much wider sustainability agenda.

Figure 5-19: Community Facilities Model 2

Feature 3: Energy efficiency

Energy efficiency is an obvious feature that can be addressed through the design of a building. The consultants were found to incorporate energy efficiency measures as integral part of the housing.

Heating schemes (3.1)

Acknowledgement of the need for efficient heating systems as part of a range of measures was made in one conversation.

> *"Not just increasing the insulation, putting good heating systems" (Int 4)*

Reduced energy requirements (3.2)

The outcome of energy efficiency (specifically increased insulation) was the need for less energy in the occupation of a housing unit. Mention of this was related to selection of components and materials.

> *"you can insulate to an extent where you use very little energy" (Int 5)*

Focus of activity (3.3)

Contractors have a shallow knowledge of energy efficiency and do not show enthusiasm for making change in their contracting practices. Contractors are unavailable to provide the expertise and resource sustainable construction.

> *"I don't know if there are any contractors who I'd call green. I know small contractors...who are genuinely interested...but I could never use them on a social housing project. They are too small" (Int 5)*

Innovative solutions (3.4)

Resistance to change came from all groups involved in social housing procurement. Tenants are not always willing to accept solutions that are too removed from the idea of a 'traditional' house. A suggestion of not installing heating was unacceptable.

> *"It would be possible to have a house with no heating....you cant say you are giving them a house with no heating" (Int 5)*

> *"So since then I suppose we haven't really gone back. Every scheme that we've been doing has been breathing wall construction" (Int 4)*

There is a perceived need to push the limits to make change to the standards that are accepted in the built environment. Justification and trade off were two aspects of introducing change on the grounds of sustainability.

"...so that what led us to, well if you're doing something different it has to do two things. You know it has to lead to a reduction in something else" (Int 5)

Regulations (3.5)

The consultants involved in the procurement process displayed a keen awareness of the development of energy efficient technology for house construction. One architect suggested that this has not been difficult because of the level of building regulations.

"..as designers we've always tried to design energy efficient housing. And its been easy, because building regulations have been so poor...." (Int 4)

Energy sources (3.6)

The concept of reducing energy use also manifested itself in tracing components and material back to source. Consideration of full energy auditing was suggested by one consultant.

"we start thinking about where is the energy coming from to manufacture the houses. Not just embodied energy but in the whole process and where are we putting it" (Int 5)

Implementation (3.7)

There are many frameworks and tools for establishing and measuring the performance of buildings in terms of sustainability. The literature review in Chapter 2 discussed some of the tools available. Consultants referred to the lack of time available to use these resources and the limitations of indicators in terms of the full breadth of sustainability.

"We don't use the BRE methodology. We couldn't do that within the time" (Int 5)

"These indicators are all very based on the physical dimension, or environmental sustainability. It doesn't really tap into the social or economic aspect." (Int 6)

Energy efficiency emerged as a broad feature of sustainability. The feature was expressed through seven sub-categories covering a broad range of issues. Barriers to implementing energy efficiency measures were encountered from contractor resistance and lack of expertise, and a shortage of time to consider all aspects.

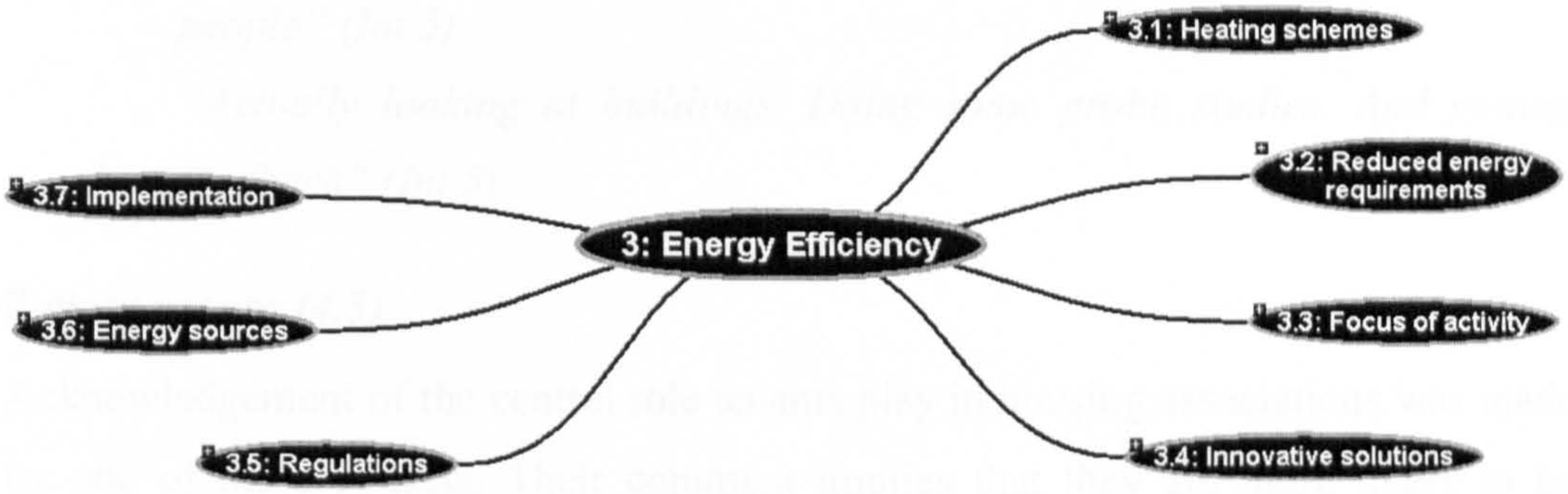


Figure 5-20: Energy Efficiency Model 2

Feature 4: Feedback

Feedback was considered a relevant part of the procurement system. The same issues that emerged from the housing association interviews were relevant to the consultants.

Occupancy feedback (4.1)

Tenants were considered useful in providing feedback on the needs of the community in a more general sense. Involvement of tenants in a feedback process was actively encouraged.

> *"You've got to find out the problems. You've got to show them that they really know about their area" (Int 4)*
>
> *"You do that by open days or exhibitions" (Int 5)*

Development cycle (4.2)

There was a strong awareness of the benefit of feedback. This seemed to suggest a systematic approach to iteration in the development of technical solutions. One of

the consultants strongly advocated the use of audit surveys to feedback into the procurement cycle.

> *"Better to go back five years later and do an audit survey of the tenants.....what worked and what didn't and giving that feedback to people" (Int 5)*

> *"Actually looking at buildings. Doing some probe studies. And getting feedback" (Int 5)*

Tenant groups (4.3)

Acknowledgement of the central role tenants play in housing associations was made by one of the architects. Their comment implies that they are more likely to be working with a locally operated housing association rather than a large national organisation. The same consultant referred to the rational of tenant groups and their specific role in connection with a housing project.

> *"housing associations over here are all tenant based. And they're all tenant run" (Int 4)*

> *"very often there would be small groups of people who are going to be re-housed" (Int 4)*

Lack of engagement (4.4)

There was also a resistance to involving tenants too heavily in decisions on construction where they had limited knowledge.

> *"....basically tenants, you wouldn't want them on site.....you make visits to site to show them..." (Int 4)*

The consultants were less enthusiastic about feedback than the housing associations had been. This may be because of their reluctance to diminish their expertise by relying on the input of the tenants. However, the consultants confirmed the relevance of each of the categories, adding to the depth of understanding of each one.

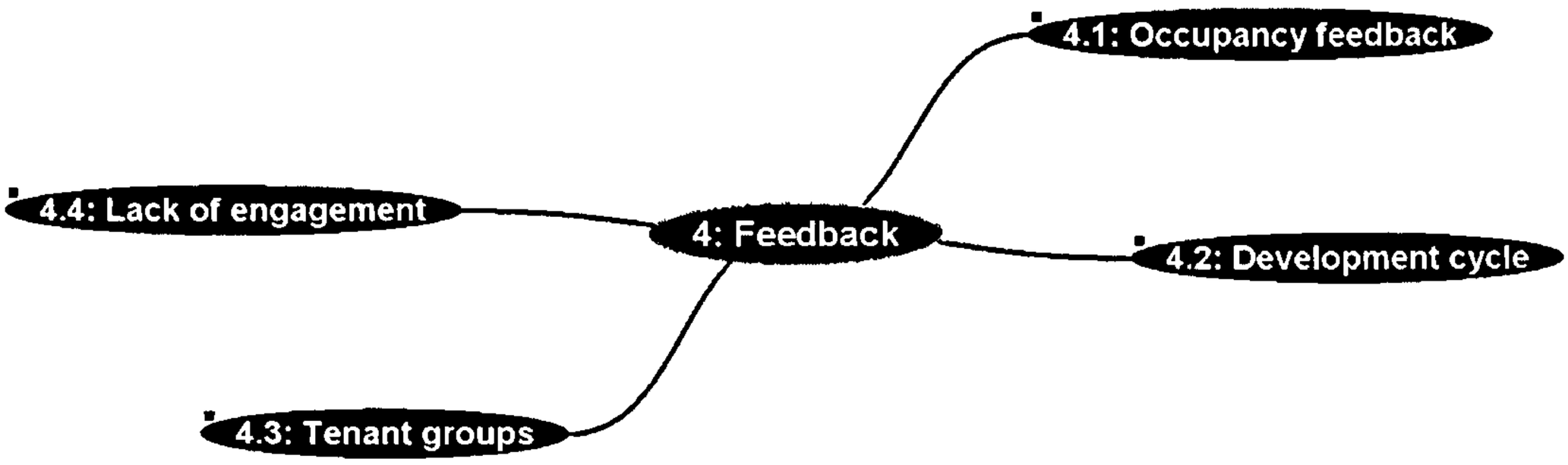


Figure 5-21: Feedback Model 2

Feature 5: Fuel poverty

Fuel poverty was an underlying feature to the consultants for delivery of sustainability. The interviews generated a further category within this feature.

Cost of heating (5.1)

The consultants were well aware of the position social housing tenants were in financially and appreciated the need for reducing fuel bills by providing energy efficient housing.

> *"...the heating bills have been a third of their income....so we are putting money in their pockets by having energy efficient housing..." (Int 5)*

There was also acknowledgement that housing associations were already addressing the issue of fuel poverty in a successful way and they were maybe not always aware that this was sustainable development.

> *"They may not have seen it as sustainable development, but they're providing local housing...they're addressing affordable warmth" (Int 6)*

Condensation (5.2)

One architect discussed the health effects of fuel poverty. Condensation thought to be a contributory factor in increasing asthma cases was a serious issue within the design of the housing.

"Poor ventilation, health problems and that sort of thing. So we've tried to take a holistic view over the last ten years. Not just increasing the insulation" (Int 4)

Political importance (5.3)

As one of the key drivers for sustainable development in the social housing sector there was political weight behind its eradication. The interviewee from the housing agency expressed a need for being able to report on the activity going on to remove fuel poverty from social housing.

"..and it will only take a minister to ask, how is Community Scotland addressing fuel poverty....unless we know what the average costs are it makes it very difficult to say" (Int 6)

Fuel poverty was equally important to the consultants and the housing associations. Recognition of the political importance by the housing agency guaranteed its priority within the social housing sector.

Figure 5-22: Fuel Poverty Model 2

Feature 6: Funding

Lowest cost (6.1)

Overwhelmingly cost limitations appeared to be a barrier to introducing innovative materials. Design solutions were rejected where they had a greater capital cost and long term life cycle costs were not given much consideration.

"But I don't think the life cycle argument is used very much.....once the QS gets the tender back, you get the cheapest ironmongery....." (Int 4)

"Anytime you do something different and its more expensive it wont be done" (Int 5)

The different parties within a contracting organisation were also found to hold different views on sustainable construction. It was common for development managers to agree to non-standard solutions, but when the project got to site the same solution was often rejected by the site personnel.

"You'll have negotiations over the cost of what you can and cant afford.....the site agent will have a different view on it" (Int 4)

Political pressures (6.2)

The housing agency representative was aware of the discrepancies experienced for the housing associations in attracting funding for projects. There appeared to nuances in the funding of certain types of development.

"Our preoccupation with housing meant that it wasn't really a business opportunity as such. There was a question as to whether the funding should be used for that." (Int 6)

"But that said for rethinking procurement there is a budget allocation, so if people want to form procurement clubs, or different ways of clubbing together to explore a new approach" (Int 6)

A comment on social inclusion partnerships suggest an imbalance of funding allocation may deny less deprived areas of funding.

"And again, I would say well what is the community? And if they only channel everything towards social inclusion partnerships. Well then what about the other areas" (Int 6)

Innovation (6.3)

Contractors were considered unwilling to engage in developing innovative solutions because they did not have the financial motivation and could not see any direct benefit.

"There's not much cost incentive for them to do anything innovative".(Int 6)

Pay back costs (6.4)

One of the consultants had developed an opinion from experience on projects that by incorporating a small additional capital cost, there would be long term savings on a development project.

"I think we said if you spend five percent extra, in the long run you're actually saving" (Int 4)

Certainty (6.5)

.The consultants felt that there was also an unwillingness of housing associations to take on risk in the form of innovation and desire for a fixed price on the development costs.

"The whole idea of what housing associations do, they want a firm price" (Int 4)

The funding of social housing appears to have a great deal of complexity. The aspect of lowest cost still exerts significant pressure within the procurement system. This can prove limiting in the delivery of innovation.

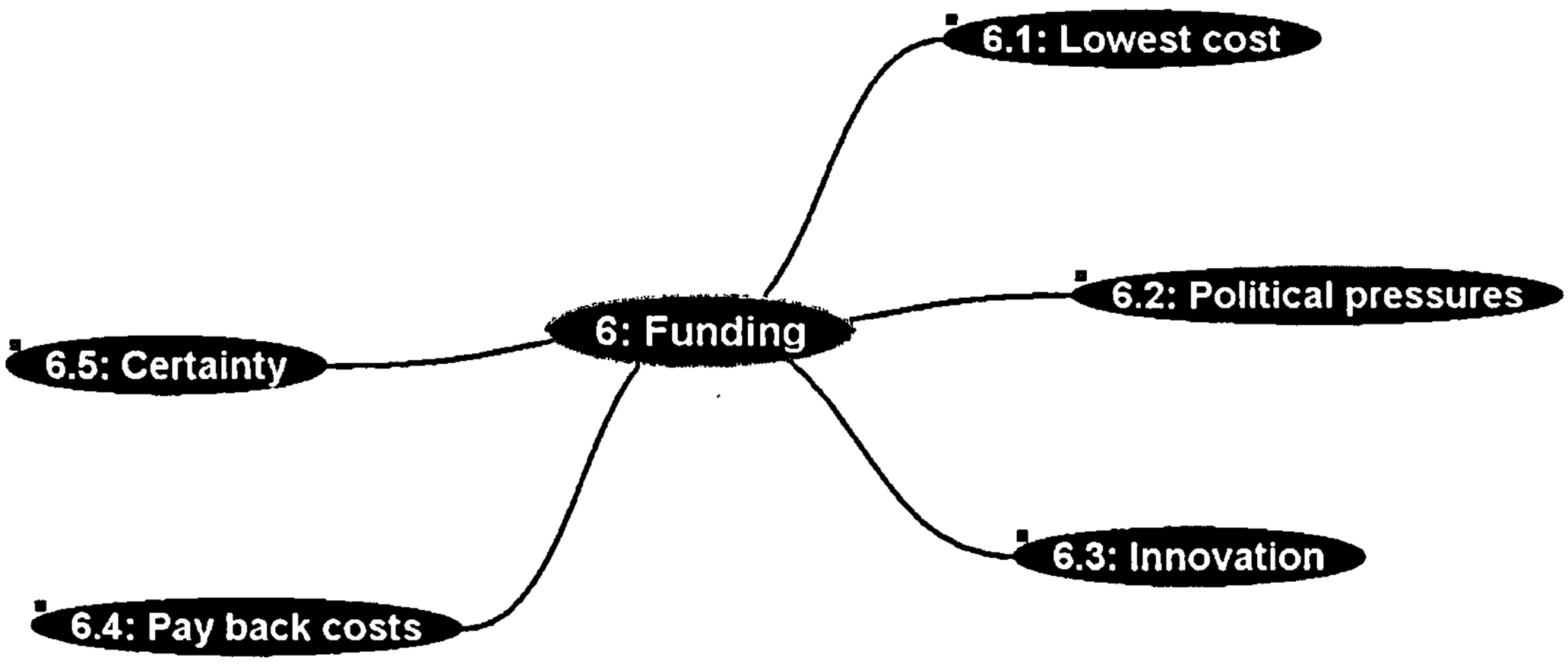


Figure 5-23: Funding Model 2

Feature 7: Insulation

Insulation, as with the housing associations, was an integral feature of sustainability. It was mentioned in relation to other features, especially fuel poverty (feature 5) and energy efficiency (feature 3).

High levels of insulation (7.1)

High levels of insulation were again perceived as an integral part of social housing development.

> *"They do understand about the basic things....well insulated, well heated houses" (Int 4)*

There was an understanding that insulation combined with other features could deliver benefits far in excess of more comfortable houses. Insulation can have a significant impact on fuel poverty.

> *"Nowadays you can insulate to an extent when you use very little energy" (Int 5)*

Regulations (7.2)

The only reference to the regulations was a comment made in general to building standards. It is assumed that this comment refers to the low thermal performance required through the building regulations.

> *"design energy efficient housing. And its been easy, because building regulations have been so poor"*

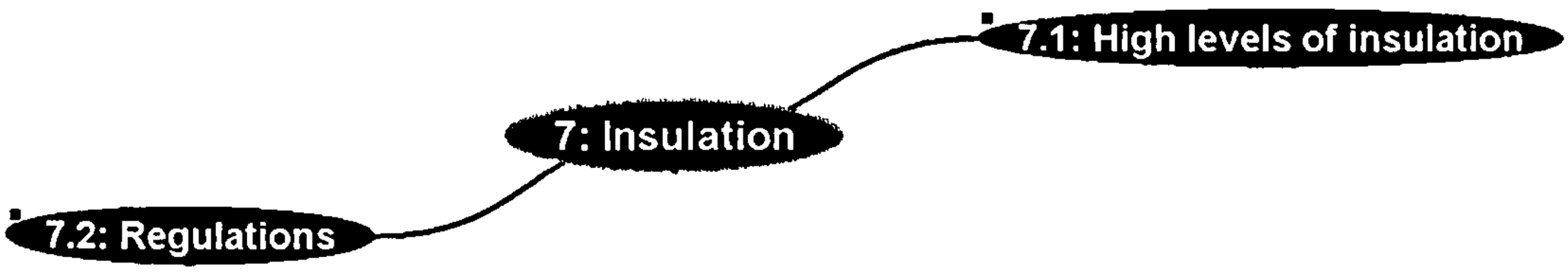


Figure 5-24: Insulation Model 2

Feature 8: Involving tenants

The consultants and the representative from the housing agency all supported the view that involvement of tenants in the procurement system was an important success factor.

Engaging with people (8.1)

The housing agency representative discussed the importance of engaging people in developing sustainable development policy and combining the knowledge and experience of the tenants and association staff.

> *"So the idea is that its something for them to engage in. And I've said to them that they're not supposed to being asking your pet consultant to do this for you. You've got to engage as an organisation and say what means for you." (Int 6)*

Responding to need (8.2)

First hand experience of good and bad aspects of housing was suggested as a useful influence on individual perspective of sustainable features.

> *"I think the only way in these sorts of areas to let people take control over their lives, is to get them involved. Right from the beginning" (Int 5)*

Matching aspirations (8.3)

The importance of providing housing that responded to tenant needs was a feature of all the interviews. There was a clear relationship between successful outcomes and involvement of tenants

> *"We came with the aim of working with local people to achieve what we wanted, and getting a solution that meets a local problem" (Int 4)*

The representative of the housing agency discussed a drive to encourage communities to become more involved with the procurement of social housing. This scheme provided funding to promote active tenant participation.

"I think it's meant to be communities empowered to assess, you know the quality of their immediate environment. And then resource the priorities that they have identified" (Int 6)

Failure to involve tenants (8.4)

When tenants needs were considered towards the end of the procurement process, significant cost were incurred in adaptations. The costs were largely to do with housing people with special needs, e.g. wheelchair access, special sanitary fittings, etc.

"The only way we end up with extras is we end up with huge amounts of adaptations when they find out who is going in" (Int 4)

Continued involvement (8.5)

The management of housing associations undertaken by tenants had a strong influence on the level of tenant participation.

"The housing associations here are all tenant based...people have got to have a cycle of experience before they can actually, appreciate some of these benefits" (Int 4)

The same five features from the propositional model were confirmed for their relevance to the consultants. Tenant involvement was recognised for the rewarding and beneficial experience it could be.

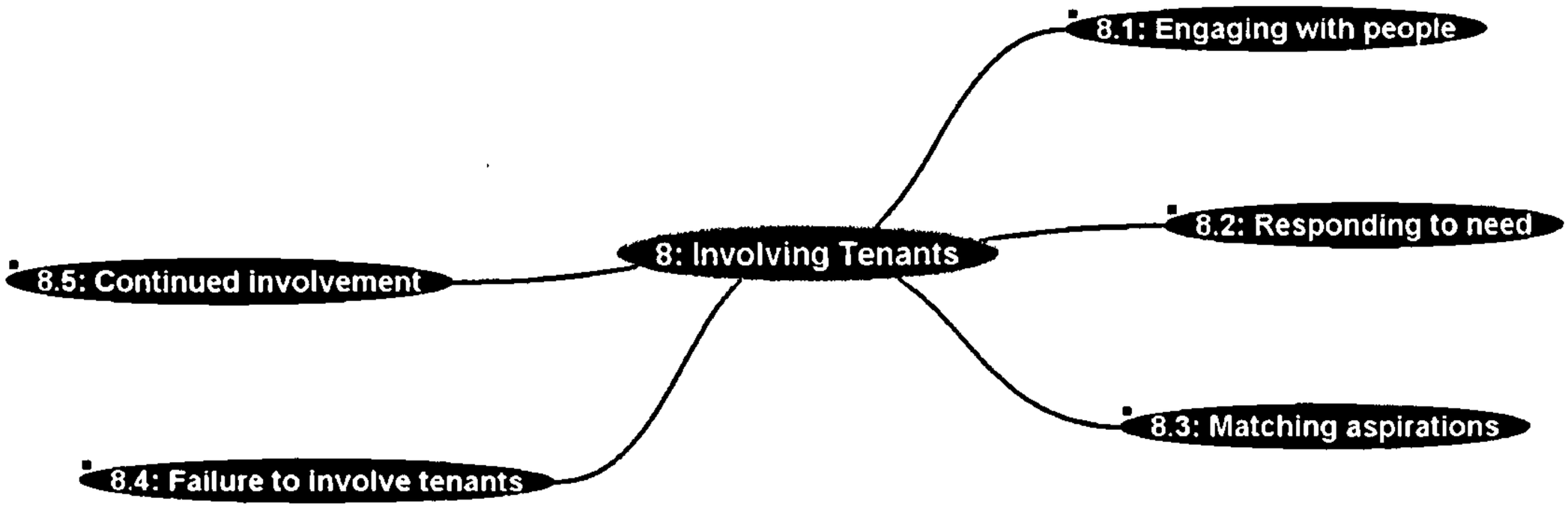


Figure 5-25: Involving tenants Model 2

Feature 9: Maintenance

Consideration of maintenance issues had an influence on the design process. The architects were both interested in the long term life of the buildings they were involved in creating.

Repair of property (9.1)

Maintenance issues were taken seriously by the housing associations and were useful in arguing the case for specific materials if the sustainability argument was not sufficiently engaging.

> *"You don't have to sell it on sustainability grounds, because that's not necessarily enough. You generally do it on long term maintenance and that sort of thing, which is a simpler argument" (Int 5)*

Maintenance free (9.2)

There was scepticism about the desire of many housing associations to have maintenance free buildings. There was some thought that this was an unrealistic goal, but was often the main interpretation of sustainability by housing association maintenance staff.

> *"A lot of input from housing associations is from their maintenance staff. They all want a maintenance free building, which means PVC windows" (Int 5)*
>
> *"They think they're not going to have maintain it. Do anything with it." (Int 5)*

Community wide initiatives (9.3)

None of the consultants specifically referred to maintenance issue for the community. One architect discussed the issue of community initiatives.

"we've always been involved in planning studies, and looking at wider areas. So, we've done a number of community plans for housing associations, looking at broader issues" (Int 4)

Maintaining buildings (9.4)

One of the consultants believed that by maintaining buildings you were creating a link between people and buildings and that this was central to sustainability issues for the built environment.

"That's not the aim of it. What I want is an easy to maintain building, where everything wears out. That there is a presence when you're caring for the building and the environment to a degree" (Int 5)

This view was again expressed in considering the impact of low maintenance materials on the aesthetic quality of the built environment. The fear was that variety and richness would be lost in the architecture.

"I don't think the maintenance free tag is the answer. Otherwise we'd have aluminium sidings everywhere" (Int 5)

A fourth category of the feature of maintenance emerged from the consultants interviews. The issue of maintaining buildings and acknowledgement of the aging process revealed a consideration of the long term perspective.

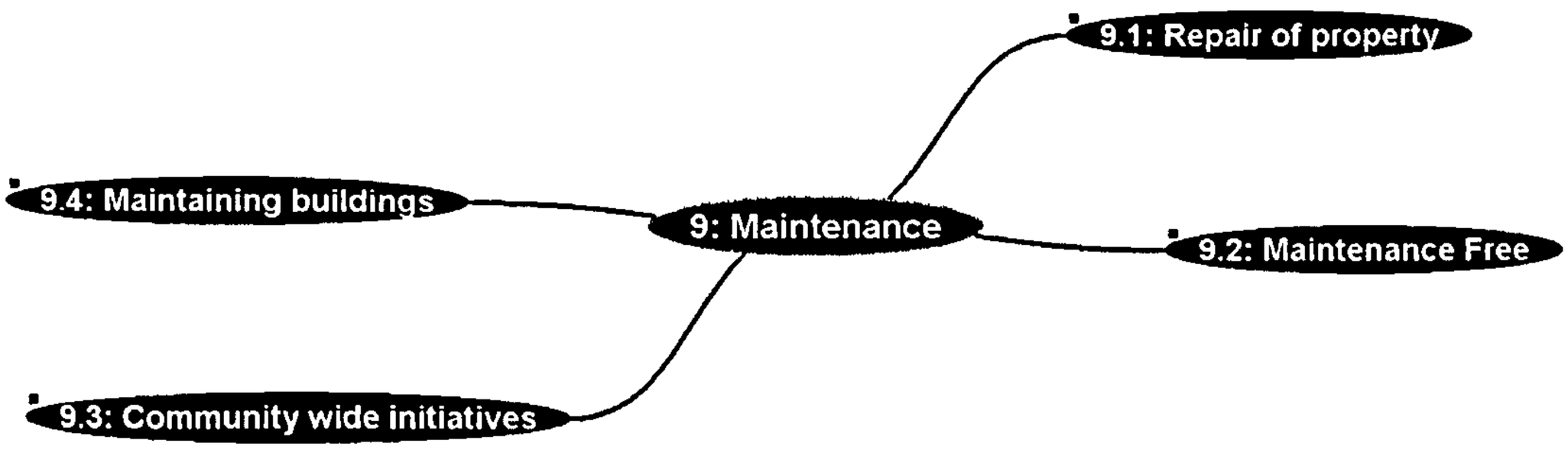


Figure 5-26: Maintenance Model 2

Feature 10: Mixed developments

The integration of more than housing into a project was a feature that emerged through the housing association discussions. Reference to mixed development was less strong in the consultant's conversations.

Integration with neighbourhoods (10.1)

The housing agency representative referred to some of the initiatives that are happening in conjunction with social housing procurement.

> *"There was also credit unions and other kinds of, food co-ops and that sort of thing. So there are initiatives that might be, like childcare facilities." (Int 6)*

Retail units (10.2)

One of the practices of architects was involved in large scale regeneration projects. This gave the opportunity to integrate retail into the community plan.

> *"looking at central area and how the doctors surgery and the chemist and the shops and you know the ..." (Int 4)*

Workspaces (10.4)

The incorporation of workspaces within housing projects was evident in one case. This was viewed as a positive measure.

> *"I was through in Queenscross in Glasgow, workspaces and other initiatives in place locally which were helped" (Int 6)*

A mix of housing and other types of development was clearly a relevant issue to the consultants. It was also viewed positively. However it did not appear easy to achieve and as such was not as important as some of the features of sustainability that were more tangible in the procurement system, such as building standards (feature 1) or energy efficiency (feature 3).

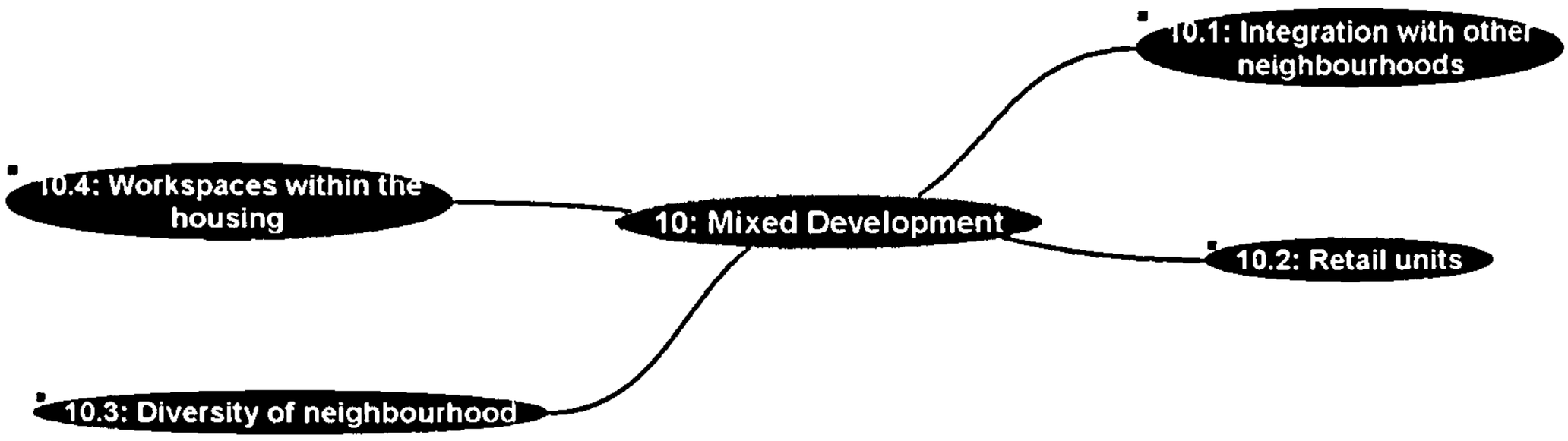


Figure 5-27: Mixed developments Model 2

Feature 11: Mixed tenure

The experience of the social housing sector has resulted in a shift in policy to incorporate a balance of types of tenure that is available to residents. Integration of different types of households, tenants, shared ownership and owner occupiers, has resulted in what is perceived as more sustainable communities.

Waiting lists (11.1)

The use of waiting lists in planning development was referred to it. It appeared that this practice was not always possible for housing associations.

> *"It was because, I suppose housing associations tend to house their own immediate people now and then after going to council waiting lists. When it was their own people they new well in advance" (Int 4)*

Social integration (11.2)

The housing agency representative reflected on the shift to a more varied mix of tenure that occurs in most social housing developments.

> *"...as we get a tenure mix introduced to areas that, I suppose have been just a single type of tenure housing" (Int 6)*

Integrating different socio-economic groups is perceived as a positive step in improving the social sustainability of a community. Although this is a politically driven agenda, there seemed to be rejection of this idealism in practice.

"When it got to planning, one of the objectors was the councillor. Not in my back yard....." (Int 5)

Existing communities (11.3)

One of the consultants reflected on the strength of feeling retained by existing communities during regeneration projects.

"they are the original community and they want to stay there. And they want their community developed" (Int 4)

Special requirements (11.6)

Provision of housing for people with disabilities emerged as a significant feature of social housing. The problem for the procurement system was that the individual requirements were not always known at the outset, but the cost of adapting all the accommodation was prohibitive.

"There was a big demand for special needs accommodation on one site"

"Its quite expensive to build that in as standard. [talking about including disabled access]"

The categories of shared ownership (11.4) and size of units (11.5) did not appear in the conversations held with any of the consultants. The category of special requirements (11.6) emerged as a new issue. Mixed tenure although recognised as a feature of sustainability did not attract the same emphasis the housing associations placed on it. Again this may be because of the distance between the procurement system and the strategic issue of tenure blance.

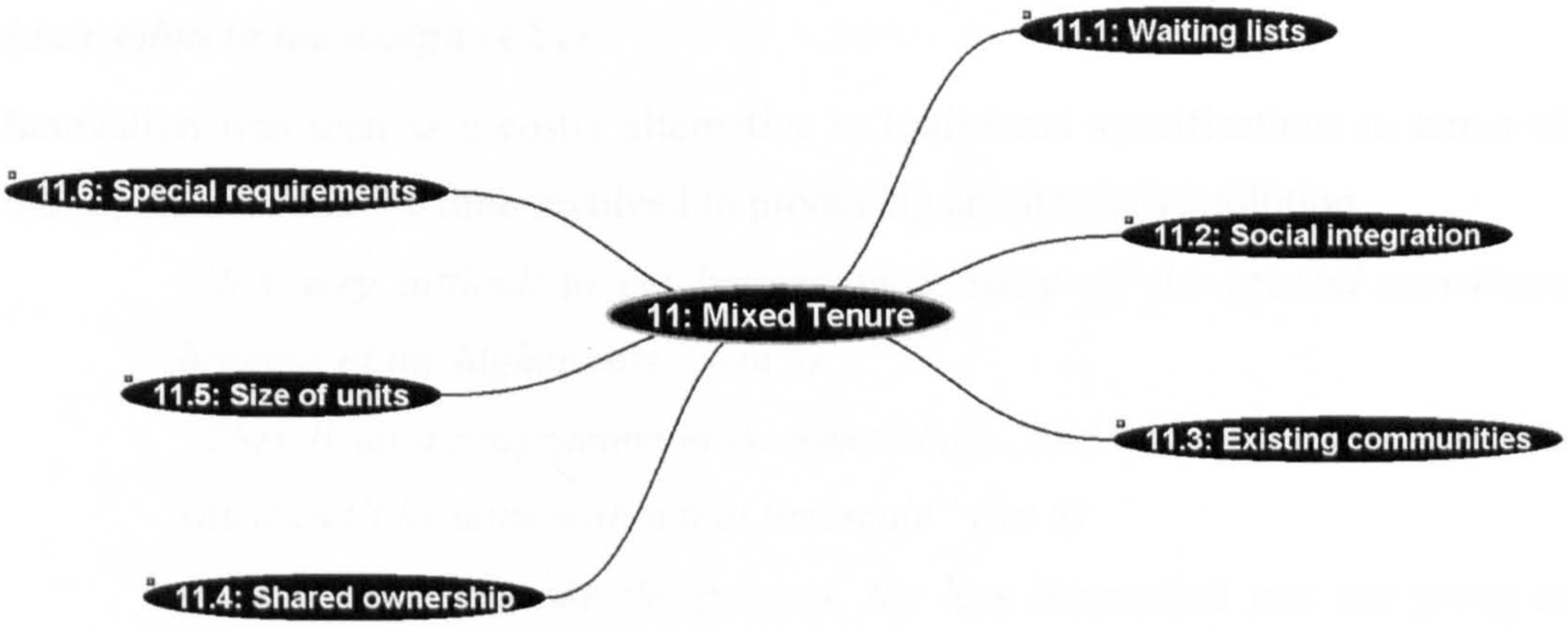


Figure 5-28: Mixed tenure Model 2

Feature 12: Quality of specification

The specification of materials and components was extremely important to the consultants that were interviewed. It seemed to be the most direct way they could input on the sustainability of the housing.

Choice of materials (12.1)

Choice of materials was being addressed in a holistic way that considered not only energy efficiency and the source of the product, but the impact the materials had on the health of the building occupants.

> *"We look at not just energy efficiency, but the type of materials that goes into them. Not just the embodied energy but their health." (Int 5)*
>
> *"Looking at healthy materials and trying to avoid less healthy materials" (Int 5)*

Personal experience impacted on the choice of materials. One interviewee remarked on the negative view individuals have over certain products if they have in had a bad experience of it.

> *"If you had bad quality timber windows, its very hard to introduce good quality timber windows. They think that you should put in UPVC" (Int 4)*

Innovation in the design (12.2)

Innovation was seen as a costly alternative to traditional specifications in terms of the capital cost and the time involved in producing an alternative solution.

> *"It's very difficult to get innovation actually off the ground sometimes because of the higher cost." (Int 5)*
>
> *"They'll set a programme to do something... and we want innovation. You say it can't be done within that timescale" (Int 5)*
>
> *"The faster you make the process, the less innovation you are going to get." (Int 5)*

Energy efficiency (12.3)

One respondent was enthusiastic about incorporating the embodied energy of materials into the decision making cycle. This forced consideration of sourcing materials into the procurement system.

> *"The great advantage of embodied energy is that you try and source things locally and you pay more attention to sourcing materials, which is good." (Int 5)*

Tenant involvement (12.4)

The aspirations of tenants emerged as a strong influence of the specification of certain components within housing. Commercial preferences seem to have a strong influence over certain groups operating in the housing sector and this seems to have a knock on effect on the decision making cycle in social housing.

> *"I think it's completely untrue that the private house builders say that people only pay for what they are given. They are never offered anything else." (Int 4)*

Commercially driven (12.5)

The purchasing of materials appeared to be removed from the decision making process as far as sustainability is concerned. The separation of specification and

purchase of materials resulted in less sustainable products being used in the construction.

> *"You've got to learn, if you're keen on sustainability, you have to follow everything down the chain and find out who made it and where it came from." (Int 4)*

Contractor involvement (12.6)

The specification was regarded as a powerful tool guaranteeing the quality and characteristics of materials and products. However in contracts other then traditionally tendered packages, there was a danger that this control would be diluted and an inferior or less sustainable product would be substituted.

> *"We have a specification now and its watertight.....and if it's a traditional contract then you should get what you asked for. But partnering for some reason doesn't manage this. Its not just partnering, but other forms of contract" (Int 4)*

Contractors were not considered to be engaged with the process of improving sustainability through the procurement system. There was evidence of inertia in responding to sustainability, predominance of financial criterion and resistance to innovative solutions.

> *"Even on greener work.....you go down the road, but when you actually get to the decision point.....they don't have support to do it and they're scared of doing it because it gives them commitment to something new." (Int 5)*

> *"To be honest it's the buyers that I have the biggest problem with.....they're the only people we never meet" (Int 4)*

> *"The main contractor will go and source things from a big distributor and you don't know where they came from." (Int 5)*

Quality of specification was a major issue to the consultants. The feature increased from four to six categories reflecting a broader perspective. A general theme was the difficulty in instigating change in the way in which housing is constructed.

Innovation and measures to increase the sustainability of the product are met with reticence from the contractors.

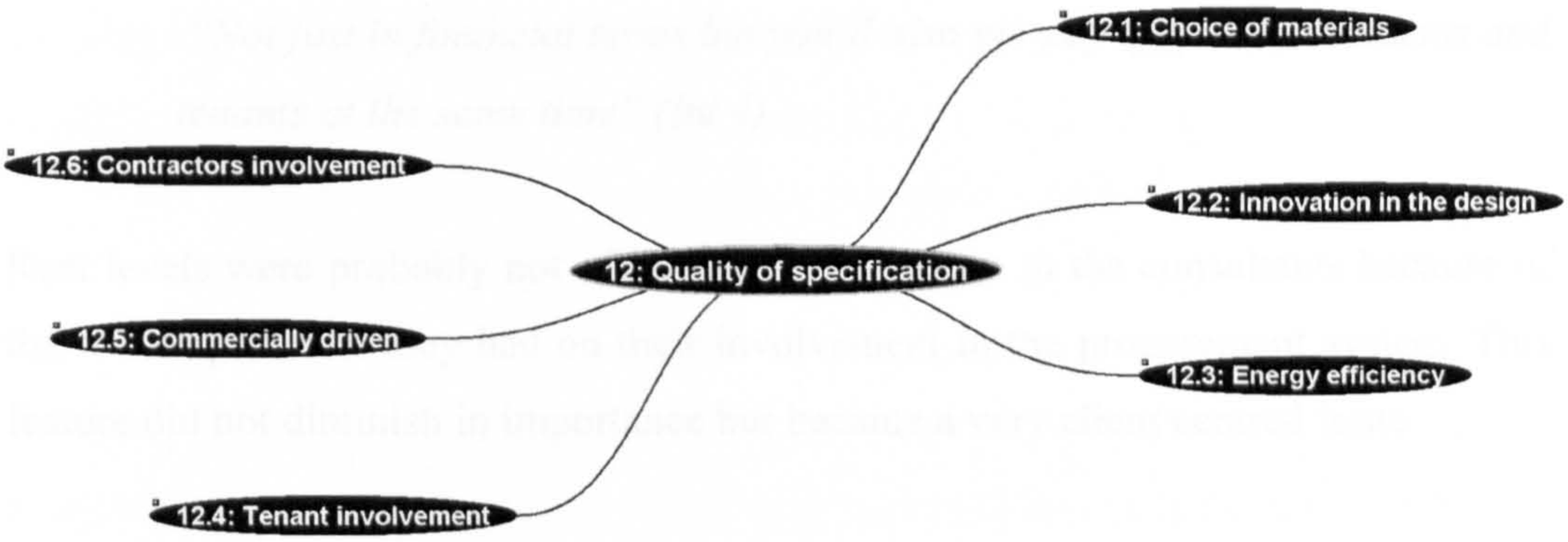


Figure 5-29: Quality of specification Model 2

Feature 13: Rent levels

Recognition of the economic position of the ultimate clients, the tenants is seen in the consultants view of social housing. No specific mention was made of the income stream required through rent for the housing associations to sustain themselves. This feature is removed from the direct procurement of the housing and although is the economic output of the housing it does not heavily influence the procurement process.

Income levels for association (13.1)

The financial circumstance of the tenants is seen as an issue for the design of housing, especially in terms of fuel poverty.

> *"Most of the housing we do is for low income tenants." (Int 5)*

Affordability by tenants (13.2)

Rent levels were not a feature that appeared in the consultant's conversations to any great extent. There was acknowledgement that the tenants were living in very difficult financial circumstances and that fuel bills were a significant part of a

households outgoings. This resulted in a concern for designing houses that made the cost of living as low as possible for tenants.

> *"Not just in financial terms but you'll also get pay off for the residents and tenants at the same time" (Int 4)*

Rent levels were probably not of immediate relevance to the consultants because of the low impact that they had on their involvement in the procurement system. This feature did not diminish in importance but became a very client centred issue.

Figure 5-30: Rent levels Model 2

Feature 14: Recycling

Recycling emerged as an additional feature of sustainability. The housing associations had not considered this aspect of sustainability in their conversations.

Availability of material (14.1)

One consultant acknowledged that it was all very well to specify recycled materials, but if there was not the availability at the right time for a project, then it was not possible to use recycled products.

> *"There is a database (recycled materials) but its not easy when they can just order, you know. So that side of it isn't perfect." (Int 4)*

> *"Its quite difficult to programme it to actually be reusing materials..." (Int 4)*

Contractor reluctance (14.2)

The consultants were concerned with the difficulty in getting contractors interested in using recycled materials. There did not seem the financial incentive that was necessary to encourage their use in the construction of social housing.

> *"...we try and get some recycled materials....they (the contractor) don't want recycled materials. When they come to site, they say nothing is available" (Int 4)*

Recycling is called for in the sustainable construction agenda, yet it seems a minority activity in the procurement of social housing. It seems to be difficult to manage in the procurement system because of contractor reluctance and a difficulty in sourcing materials.

Figure 5-31: Recycling Model 2

5.7.3 The Emergent model of sustainable procurement

The emergent model of sustainable procurement comprises fourteen main features of sustainability (Figure 5.32). The model confirms the features generated through the conversations with the housing associations and strengthens their relevance to the procurement system. Each feature is populated by a range of sub-categories pertaining to the main category. The features developed as a result of repeated open and axial coding of the data. The features are arranged in a hierarchical arrangement which helps to understand the dominance of some features. The full range of categories for each feature can be seen in Appendix A.

Recycling (feature 14) emerged as a new feature of sustainability from the conversations with the consultants. This feature, not the most dominant for the consultants, represents a recent technical development in the procurement system. It had not registered as important with the housing associations but it is clearly recognised for its role in the procurement system by the consultants and it is likely that housing associations will become more aware if its relevance in the future.

Energy efficiency (feature 3) and Quality of specification (feature 12) generated the broadest range of sub-categories. Within both of theses features the sub-categories ranged from subjective choices on material or technology to the difficulties encountered in delivering solutions through the procurement system. Rent levels (feature 13) and Recycling (feature 14) generated only two or three sub-categories. These features represent the narrowest range of issues, reflecting less relevance of these features to the procurement system. It makes it possible to generalise on the relative importance of the features to the procurement system by considering their breadth within the model. It provides a useful indicator of the perception that each feature has for those involved in the procurement of social housing.

The complexity of the emergent model of sustainability is further developed by the range of connections that emerged through the axial coding process. Use of NUD*IST software and hand coding reveals the relationships discovered between main features and the sub-categories. Development of these relationships increases the complexity of the model. Associations developed between sub-categories increasing the comprehension of sustainability for social housing procurement. These connections are represented on the model by red lines (reduced in number for clarity) (Figure 5.32). Increasing the density of the features allows theoretical components to emerge from the analysis of the data. The components are developed as paradigm models in the following section.

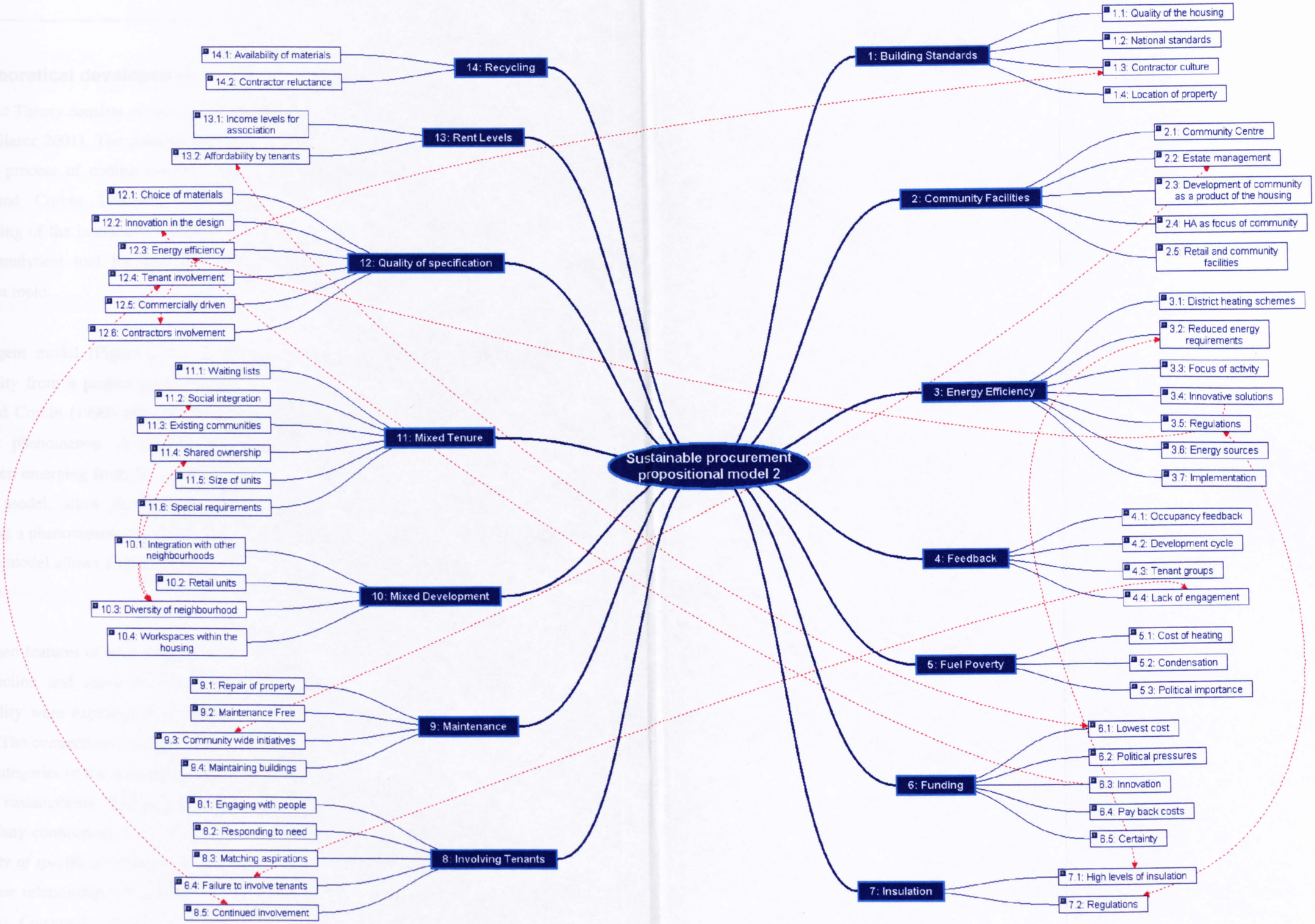


Figure 5 -32: Emergent Model of Sustainability

5.7.4 Theoretical development

A Grounded Theory consists of concepts integrated by patterns that emerge from the analysis (Glaser 2001). The patterns are realised through the coding process. The systematic process of coding involves '*making connections between categories*' (Strauss and Corbin 1990:97). Identifying these connections develops an understanding of the interactive nature of features. Grounded theory approach is a powerful analytical tool for increasing comprehension of a series of concepts relating to a topic.

The emergent model (Figure 5.32) identifies a number of features that define sustainability from a project perspective. In order to develop a grounded theory Strauss and Corbin (1990) advocate the use of a paradigm model to analyse each feature or phenomenon. A paradigm model creates a holistic view of each phenomenon emerging from the grounded theory approach. The components of the paradigm model, allow the researcher to explore the conditions and context surrounding a phenomenon and look at the actions being taken in response to it. The use of this model allows a much richer, contextual understanding of the phenomena to develop.

The fourteen features of sustainability were generated out of an iterative process of data collection and analysis. The relationships between the main features of sustainability were explored through axial coding to reveal connections between concepts. The connections consist of similarities and overlap between the categories and sub-categories of the main features developed in the generation of the emergent model of sustainability. This resulted in a number of the features being strongly linked. Many connections were discovered between *building standards* (feature 1) and *quality of specification* (feature 12) The feature of *energy efficiency* (feature 3) held a close relationship with the features of *insulation* (feature 7) and *fuel poverty* (feature 5). *Community facilities* (feature 2) held a strong relationship with *mixed*

development (feature 10) and mixed tenure (feature 11). *Funding* (feature 6) and *rent levels* (feature 13) were combined due to the underlying financial aspects of each of the features. A final combination of features occurred between *involving tenants* (feature 8) and *feedback* (feature 4). The fourteen features from the propositional models developed into seven phenomena (Figure 5.33). These formed the basis of the paradigm models.

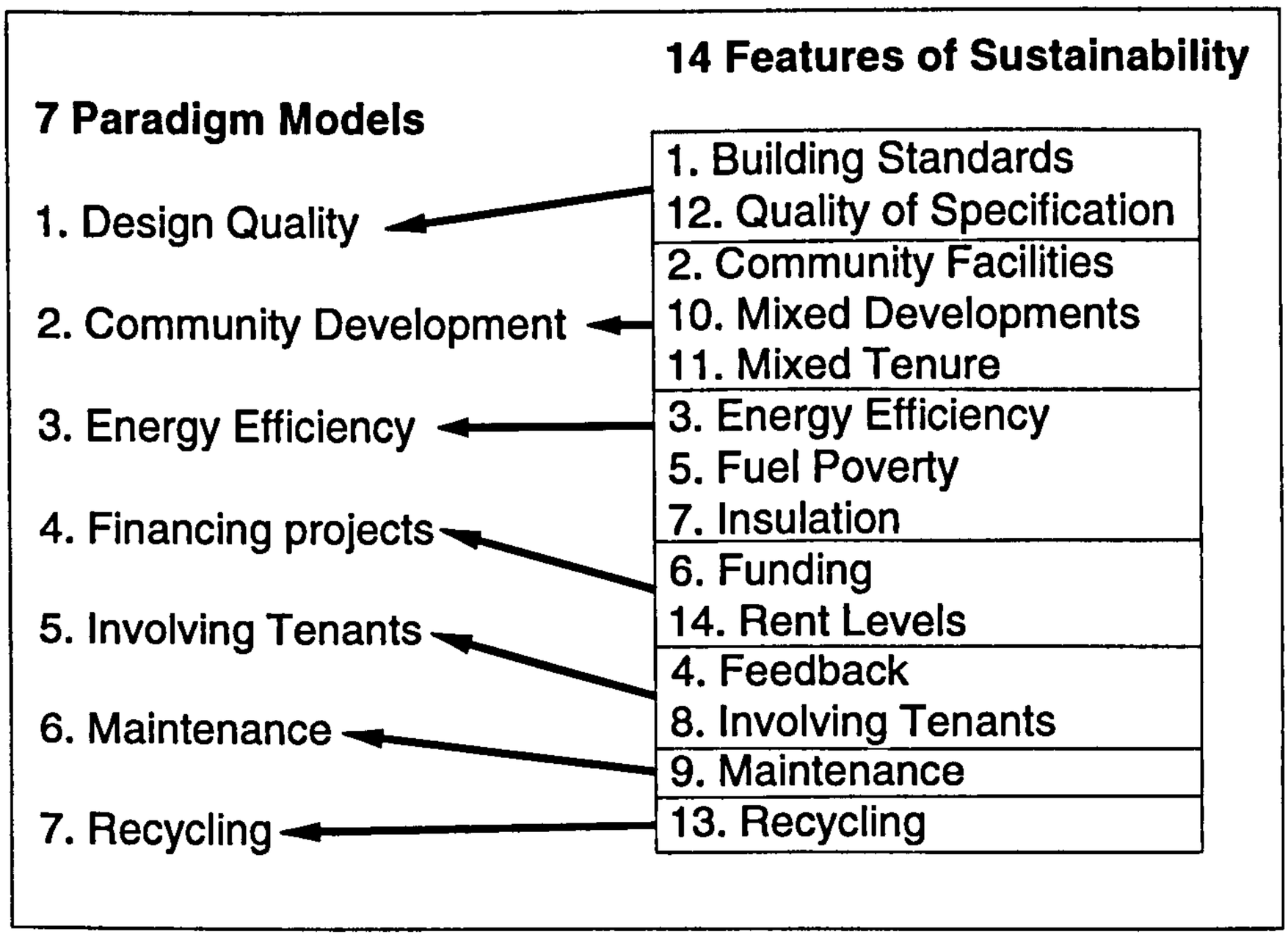


Figure 5-33: Features of sustainability and Phenomena for the paradigm models

The paradigm models are produced using an analysis framework (Figure 5.2) based on establishing conditional and contextual factors relating to a phenomenon. Each paradigm model has been developed from the features emerging out of the GT study and considers the impact that the particular phenomenon has in relation to its environment.

Paradigm Model 1: Design Quality

Social housing development is set in the context of the national house building sector. This sector is dominated by the major house developers, influencing and

responding to the demands of the consumer. This appears to have an impact on social housing. There is an increasing need to develop housing that meets the aspirations of the tenants, who are in turn influenced by the market at large. Quality improvements in social housing have been influenced by several external factors. The housing industry has set standards for house building that social housing has aspired to and exceeded on many occasions. Tenant aspirations combined with their ability to select a housing association have increased pressure on the quality required in housing. Housing associations have to ensure their property is desirable enough to maintain demand.

The housing agencies have ensured that social housing is now exceeding the standard of much private housing because of the pressure exerted on social housing to construct in excess of the standards required by building regulations. This applies most closely to thermal insulation standards.

Housing associations with development programmes are increasingly using in-house standards. This may take the form of anything from a set of general standards to a rigorous development plan with standard house types and protocols for every aspect of the procurement process.

Large house builders have been responsible for homogenising the housing stock of the UK. Tenants now aspire to established trends coming out of the private sector. One of the consultants expressed dismay at the consumer delight in "*luxury kitchens and bit of tiling in the bathroom*" There was a feeling that newly procured social housing is exceeding the quality of new private housing. It is often constructed to standards that exceed the requirements of the building regulations. This applies particularly to the levels of insulation found in some of recent social housing projects. One of the consultants felt that the social housing sector had taken the issue of quality and life cycle assessment too far with some specification. The quality of

materials and components was considered by that interviewee to in some way exceed the value of the property.

The housing associations had all developed standard specifications. The detail and sophistication varied but the premise remained the same. Certain products, components or methods of construction were considered best practice. The choice of materials was influenced by previous experience. The consultants were concerned with the issue of embodied energy and tracing products back to their primary source. Although a laudable aim the culture of the industry set up barriers to implementing innovative or alternative solutions to the basic standards. Frustration at lack of time to develop solutions was apparent with the views of the consultants. There was a feeling that there was not enough time or support to fully exploit the possible sustainable solutions that were already available. The toolkits and frameworks were too complex, time consuming or inaccessible to make the problem any easier.

Tenant involvement in the development of specification proved useful in creating a positive culture. The practicalities of involving residents in the procurement system were not as straightforward. There were many situations where tenants remained unconvinced with an innovative solution that did not reflect the idea of a house held by an individual. One consultant explained that a tenant that had experienced poor quality timber windows would assume that UPVC windows were superior regardless of the sustainability argument against their use. There were also positive contributions that tenants could make to specification development in terms of meeting the ultimate needs of the individual and the community.

The design quality relates in a number of ways to the other six phenomena emerging out of this research. Significant barriers to improving the quality of housing specification are found within the procurement system. Lack of time; contractor resistance; and supply chain difficulties all impact on the ability to improve the specification to make the product more sustainable.

Paradigm Model 1: Design Quality

Causal Conditions

- The need to meet standards required by housing agencies
- Increasing aspirations of tenants must be met
- Long term demand for housing must be maintained
- Commercially driven
- In-house standard specifications
- Contractor involvement

Context

- National standards
- Location of property
- In-house standards
- Choice of materials in relation to embodied energy, source and health considered
- Innovation in design leads to alternative materials
- Influenced by large house builders and aspirations of tenants
- Disjointed relationship between designer and contractor

Intervening Conditions

- Contractor culture
- Quality of components
- Contractor purchasing materials and components – lowest cost is a driver
- Innovation rejected to higher cost
- Cycle of experience required for tenant acceptance of innovation
- Long term maintenance considered in choice of components
- Health of materials – impact on health of occupants
- Not enough time to source materials that meet sustainable criteria
- Inadequate time or control over procurement to trace source of materials / components
- Resistance to alternative solutions

Action / Interaction Strategy

- Site specific innovation
- Traditional designs
- Preferred suppliers
- Materials specified from renewable resources
- Tenants involved in development of specification

Consequences

- Quality of the housing
- Innovation and sustainable choice of materials difficult to deliver in projects
- Tendency towards standard specifications
- Difficulty in evolving specification - preference for tried and tested methods

Figure 5-34: Paradigm Model 1 – Design Quality

Paradigm 2: Community Development

Social housing is primarily designed to provide a place to live for a household, generally on a low income. It is recognised that housing is only part of the equation in terms of the remit of social housing. There is acknowledgement that forming and enhancing a community is vital to the long term success and demand of the housing.

There is a significant drive through the housing agencies to encourage the inclusion of mixed use developments, especially in locations where communities already exist. There are many perceived benefits of including workspaces and retail units within a housing project - provision of local services; development of a local economy; adding vibrancy to the community. However this has proved a difficult aim to achieve in the procurement system.

Mixed use developments are dependent on private finance in most situations. Deprived areas are more likely to attract public funding due to the political nature of intervention. This results in areas that are less badly deprived receiving little or no funding. This leads to what seems to be an unfair allocation of funding.

Inclusion of a community centre is a popular means to drawing a community together. It seems to be the most tangible way that a housing association can provide an element of mixed use into their projects. Although considered a positive asset, there was evidence that a community centre was difficult to finance and potentially did not work if not well set up.

Changing household profiles has put pressure on the social housing sector. Housing associations need to provide a range of property size to respond to needs of their tenants. This has an impact on the procurement system in terms of property size and the flexibility built into the housing. The housing associations found that dealing with existing communities was favourable to having to rely on waiting lists. Waiting lists were rarely able to predict accurately the tenure mix that would be required.

The ability to establish requirements from existing tenant groups was shown to minimise alterations that might be required for tenants. Significant adaptations needed for tenants proved to be more expensive than developing bespoke solutions for specific tenants on some projects.

An increased desire for full or shared ownership of housing has put pressure on the housing associations. The small and medium association expressed reluctance to enter into sales of properties, because of a need to retain their assets. Tenants involved in shared ownership were increasingly showing a desire to under occupy. This resulted in a change in balance between one and two bedroom properties being required and potentially constructed. The large association expressed reservation in the creation of too many large properties but equally felt that the financial difference between one bedroom and two bedroom property was not hugely significant in relation to the benefit and flexibility gained through having a larger unit.

Due to pressure on land availability, private developers are producing housing for private sale adjacent to social housing stock. This has forced a change in the economic profile of predominantly low income communities. The integration of private developments in or close to social housing projects provides an economic and social catalyst for improvement. The small association was witness to a vast improvement in social cohesiveness that has taken place over the last ten years and felt that the presence of private housing would continue this improvement.

Paradigm Model 2: Community Development

Causal Conditions

- Projects are taking place in existing communities
- Funding is available in some areas for community facilities
- Housing is not the "total solution" for the problems facing a community
- Increased diversity of uses believed to be important in improving community
- Political motivation to increase social integration of different communities
- Changing profile of households
- Desire for shared ownership or full ownership of properties

Context

- Tenant involvement in community
- Existing facilities are sometimes already operating
- Housing association is often tenant based
- Workspaces incorporated into housing
- Retail units within neighbourhood
- existing retail units are often poor quality
- Waiting lists provide housing associations with information on prospective tenant households
- Existing communities evolve and tenure requirements change
- Increasing incidence of mixed private and social housing within developments

Intervening Conditions

- Seedcorn grant funding is available to some areas
- Presence of private tenants and owner occupiers affects community
- Difficulty in financing building and operating community facilities
- Difficult to incorporate into the development of social housing projects
- Limited ability to attract economic activity
- Desire to under occupy a property
- Limited use of waiting lists to meet specific tenure requirements
- Shared ownership is limited to retain assets by housing associations

Action / Interaction Strategy

- Estate management role
- Community centre as part of housing project
- Difficult to get funding for mixed use developments
- Develop a range of unit sizes to match existing communities or waiting lists
- Matching waiting lists to development strategies – not always successful in matching needs exactly

Consequences

- Integration with adjacent neighbourhood
- Increased economic activity within community
- Quality of retail units is variable
- Vibrancy of community is improved
- Local employment opportunities
- Catalyst for external development and activity
- Improving communities contributes to increased desirability
- Additional financial burden from developing bespoke solutions
- Increased number of large units
- Ability to meet exact requirements of tenants
- Balance of large and small units
- Additional costs involved in making adaptations

Figure 5-35: Paradigm Model 2 – Community Development

Paradigm Model 3: Energy Efficiency

Energy efficiency subsumed the features of fuel poverty and insulation that had originally stood on their own in terms of features of sustainability, but have been brought together because of a significant amount of cross reference.

The most dominant feature was a need to reduce the heating costs for tenants. This manifested itself in several ways. Increased levels of insulation were of prime importance in terms of reducing the amount of energy that is used in maintaining a good level of comfort in the housing. This feature of sustainability appeared to have an intrinsic quality. The underlying assumption was that high levels of insulation were beneficial to the sustainability of the housing. Consequentially this benefited tenants in terms of their economic well being and the housing association in terms of reduced damage to property from condensation. The global benefit can be measured in the ultimate reduction in CO_2 emissions from reduced reliance on heating. The social benefits are more difficult to ascertain but from the conversations it was clear that energy efficiency was instrumental in improving the quality of life for many tenants.

Much of the existing housing stock owned in the social housing sector suffers from damp and poor quality inefficient heating systems. The procurement of new social housing must consider the heating system carefully in terms of efficiency for the tenants and long term maintenance for the housing association. Innovative schemes are evident with varying success using district heating and photovoltaic cells. Incorporation of innovation is found to be time consuming and does not always deliver the benefits that are suggested. There is not the industry support to drive these ideas forward.

The underlying principle of improving energy efficiency is driven by both political and social ends. Politically the housing agency must be able to report to ministers on improvements made in eradicating fuel poverty and reducing CO_2 emissions. This is

a catalyst for improvements in the energy efficiency of social housing procurement. The effect is reduced by the resistance from the construction industry and tenant mistrust of new technology.

Paradigm Model 3: Energy Efficiency

Causal Conditions

- Global concern for the environment
- Need to reduce tenants fuel bills
- Low income households
- SAP rating required in EcoHomes rating and building regulations
- Need CO_2 emissions

Context

- Poor standards found in the building regulations
- Increased awareness
- Lack of experience and knowledge
- Housing with inappropriate / inefficient heating systems
- Damp houses caused by condensation
- Political issue – government interest in reducing fuel poverty
- Underlying principle
- Intrinsic to development of housing
- High levels of insulation are desirable

Intervening Conditions

- Contractor resistance
- Established technology is preferred
- Fear of fuel bills resulting in tenants not using heating
- Poor insulation levels
- Linked to need for good ventilation

Action / Interaction Strategy

- Tracking of energy use through entire procurement system
- Consideration of embodied energy
- Innovative technology introduced
- Advice on heating system relating to fuel source / boiler type
- Monitoring of heating costs
- Increase levels of insulation above building regulation standards

Consequences

- Improved standard of living achieved by improved energy efficiency

Figure 5-36: Paradigm Model 3 – Energy efficiency

Paradigm Model 4: Financial Factors

Funding for the housing association development work comes partially from the housing agencies and the remainder from private finance. It was generally perceived that innovation in projects to deliver sustainability was a more expensive procurement option. There is still a strong culture of attempting to reduce costs through the purchase of cheap components and materials. Contractors were found to be concerned primarily with reducing capital cost and not interested in the life-cycle argument. The value system for selecting materials or components seemed to be based on lowest price.

Competition for funding was considered to be to the detriment of the product quality. It was believed that funding was easier to attract if the housing project was in a deprived area that had received political attention. Competition was also found to have an affect on quality, economic pressure resulting in lower quality.

Innovative solutions were regarded as a source of difficulty for contractors. The estimators and buyers that were furthest removed from the design consultation were responsible for making changes to agreed specifications on the grounds of cost savings. Long term pay-back of alternative solutions was not appreciated by contractors. Financial incentive for implementing innovative solutions was not available in many contracts. This seemed to have the result of slowing integration of more sustainable materials and components.

Rent levels are regulated by the housing agencies and cannot be increased above agreed limits. Housing associations rely on rental income to maintain their business and high demand for properties is an important factor in the income stream of many associations. A high proportion of tenants has a low income and can only afford their rent because of housing benefit. The rental levels of properties therefore must be affordable to tenants and adequate economically to the housing associations. Any increase in procurement costs is liable to have an impact on rental levels. This is a

long term strategic concern for housing associations, dependent as they are on their rental income.

Paradigm Model 4: Financial Factors

Causal Conditions

- Competition for housing agency funding
- Income stream for housing association

Context

- Innovative solution perceived as more expensive
- Life cycle argument not used
- Housing associations not wanting risk of innovation within project budget
- Tenants are often in receipt of housing benefit
- Ability of housing association to provide services

Intervening Conditions

- Inequitable allocation of funding
- Political pressures in favour of deeply deprived areas
- No incentive for contractors to engage with innovative solutions
- Lack of "buy-in" to innovation by site personnel and estimators
- Affordability by tenants
- Housing association budgetary requirements

Action / Interaction Strategy

- pay back costs considered in assessing innovative solutions
- Cheapest options preferred by contractors
- Value for money not considered
- Competition for contractors leads to lower quality

Consequences

- Cheapest components used
- Innovation limited by a desire for certainty in costs
- Site personnel change specification to less sustainable options on the basis of ease of supply and lower capital cost
- Financial viability of housing association
- Long term satisfaction of tenants

Figure 5-37: Paradigm Model 4 – Financial Factors

Paradigm Model 5: Involving tenants

Involving tenants in the procurement process is evident in social housing development. Social and business benefits can be achieved by ensuring the involvement was positive in terms of the outcome of the housing. Responding to tenant feedback before, during and after the development process has provided improvements in the end product and the ultimate satisfaction of the tenants. This has the consequence of maintaining long term demand for the property.

Various instruments of tenant involvement and feedback were in use: tenant requirement surveys; focus groups; post occupancy feedback; feedback at end of defects liability period; tenant representatives; tenants on board. All of these methods sought to involve tenants in the procurement process, with the aim of achieving housing that met the needs and aspirations of the intended community. While generally perceived as a positive and essential part of the procurement process, consultants expressed a view that tenant involvement can be difficult to manage and in some cases detrimental to the long term sustainability aims of a project.

Tenant involvement allowed the specification and tenure mix to be developed to meet the exact requirements of existing communities. This was deemed especially useful in large scale regeneration projects, where 'buy-in' by the community was absolutely critical to its successful outcome. There was some concern that reliance on waiting lists to establish need was unreliable. A high proportion of tenants have special requirements for housing adaptations. This need is not captured through waiting lists and resulted in some projects with significant adaptation requirements.

Paradigm Model 5: Involving Tenants

Causal Conditions

- Desire for improvement to quality of housing
- Responding to tenants needs
- Perceived benefit of involving tenants
- Need to meet requirements of tenants

Context

- Tenant satisfaction gauged in surveys
- Studies of existing stock
- Existing tenants re-housed in regeneration projects – meeting specific requirements
- Prospective tenants – forecasting tenant profile

Intervening Conditions

- Difficulty in getting interest where there is no cause for complaint
- Uncertainty in tenant profile – wheelchair access, household size
- Existing communities with specific requirements

Action / Interaction Strategy

- Audit surveys and post occupancy feedback
- Building studies
- Immediate occupancy survey
- Focus groups
- Providing information to tenants
- Engaging tenants in procurement process
- Empowering tenants to express their housing preferences and needs

Consequences

- Can interrupt development programme
- Tenant satisfaction
- Significant costs involved with adaptations because of not knowing tenant requirements at time of development
- Increased involvement in community
- Bespoke solutions provided for existing communities
- General requirements met in housing but adaptations have to be made for a large percentage of tenants

Figure 5-38: Paradigm Model 5 Involving Tenants

Paradigm Model 6: Maintenance

Maintenance of housing is a significant obligation to housing associations. They are not only responsible for procuring new housing but maintaining it through its life-

cycle. Their remit as an organisation is to manage the property and retain its value as an asset. This responsibility is further heightened by a need to respond to individual tenant requests for maintenance of their property. Decisions involved in the procurement process may impact heavily on the maintenance cycle over the life of a property.

The consultants felt that maintenance officers were unrealistic in their requests for what were perceived as 'maintenance free' buildings. The maintenance life cycle of a component was a strong factor in its specification. The components that had been shown to have less maintenance requirements because of higher quality were specified even where costs increase was inevitable. One consultant considered that the relationship between buildings and people can be strengthened through an active maintenance routine. The subsequent involvement between tenants and their property may lead to an increased awareness of their immediate environment. Aging of buildings and materials, while often considered negative in terms of maintenance was sometimes thought to have a positive effect on the aesthetic quality of the housing.

A wider aspect of maintenance was the expectation that housing associations would be involved in estate management if they were a community based organisation. There was some feeling that the integration of private tenants and owner occupiers into communities had resulted in some instances of degradation of the visual amenity of the area. One association had entered into an agreement to offer low cost maintenance to private residents in an attempt to maintain the quality of environment that they were introducing through their own projects.

Paradigm Model 6: Maintenance

Causal Conditions

- Aging of properties
- Responding to tenants

Context

- Housing stock requires continuous maintenance
- Maintenance officers consider maintenance free buildings to be sustainable
- Pressure of housing associations to maintain more than the housing stock – expectation to be involved in estate management
- Linked to life expectancy of housing and components (i.e. windows, doors)
- Local presence of housing association

Intervening Conditions

- Presence of private tenants can lead to estate management problems
- Owner occupied properties if not maintained can reduce the visual amenity of a neighbourhood

Action / Interaction Strategy

- Long term cycle of repair and maintenance
- Component replacement
- Availability of service and staff to tenants

Consequences

- Lack of maintenance leads to poor aesthetic environment
- Aging of property can be positive or negative – linked to quality of materials
- Increases involvement between buildings and people – awareness of immediate environment

Figure 5-39: Paradigm Model 6 – Maintenance

Paradigm Model 7 Recycling

Recycling emerged from the interviews with the consultants. The consultants were concerned with the integration of recycled materials into new housing and the difficulties surrounding implementing this. The lack of reference to recycling by the housing association interviewees might be explained by the position they hold in the procurement system. They are removed from the direct sourcing of materials that was of interest to the consultants.

The consultants had experienced resistance from contractors to use recycled materials. This was further exacerbated by a difficulty in sourcing recycled materials. Contractors were found to have seemingly refused requests for sourcing of recycled products, claiming difficulty with the timing and availability of supplies. One consultant felt that even with commitment to sourcing recycled materials for a project, it was impossible to make the contractors support the idea. There was a general feeling that contractors were happier purchasing 'new' products from existing suppliers, where they could make use of established discounts.

The topic of tenant recycling was not raised in any of the interviews. This could be explained by the slow way the UK as a nation has had towards recycling and the fairly recent drives by local councils to implement domestic recycling.

Paradigm Model 7: Recycling

Causal Conditions
- Desire to reduce the drain on resources
- Reduction in waste required

Context
- Recycled materials
- Availability of recycled construction materials

Intervening Conditions
- Difficulty in sourcing materials especially at the exact time in the programme that they are required
- Contractor reluctance to source recycled materials – no incentive and increased workload

Action / Interaction Strategy
- Contractor does not assist in sourcing recycled material
- Contractor preference for new materials – ease of ordering from existing known suppliers
- Consultants have limited resource in time and availability to find recycled materials

Consequences
- Recycled materials have limited application in the procurement system as the supply chain stands

Figure 5-40: Paradigm Model 7 – Recycling

The paradigm models constitute the components of the grounded theory of sustainable procurement of social housing (Figure 5.41). The features emerging from the conversations were repeatedly analysed to achieve conceptual density resulting in the seven paradigm models. Each paradigm model has been developed from the same analytical framework (Figure 5.2). The phenomena have been analysed in terms of their contexts and the conditional features that impact upon them. The actions and consequences of each phenomenon of sustainability have been explored to complete the picture.

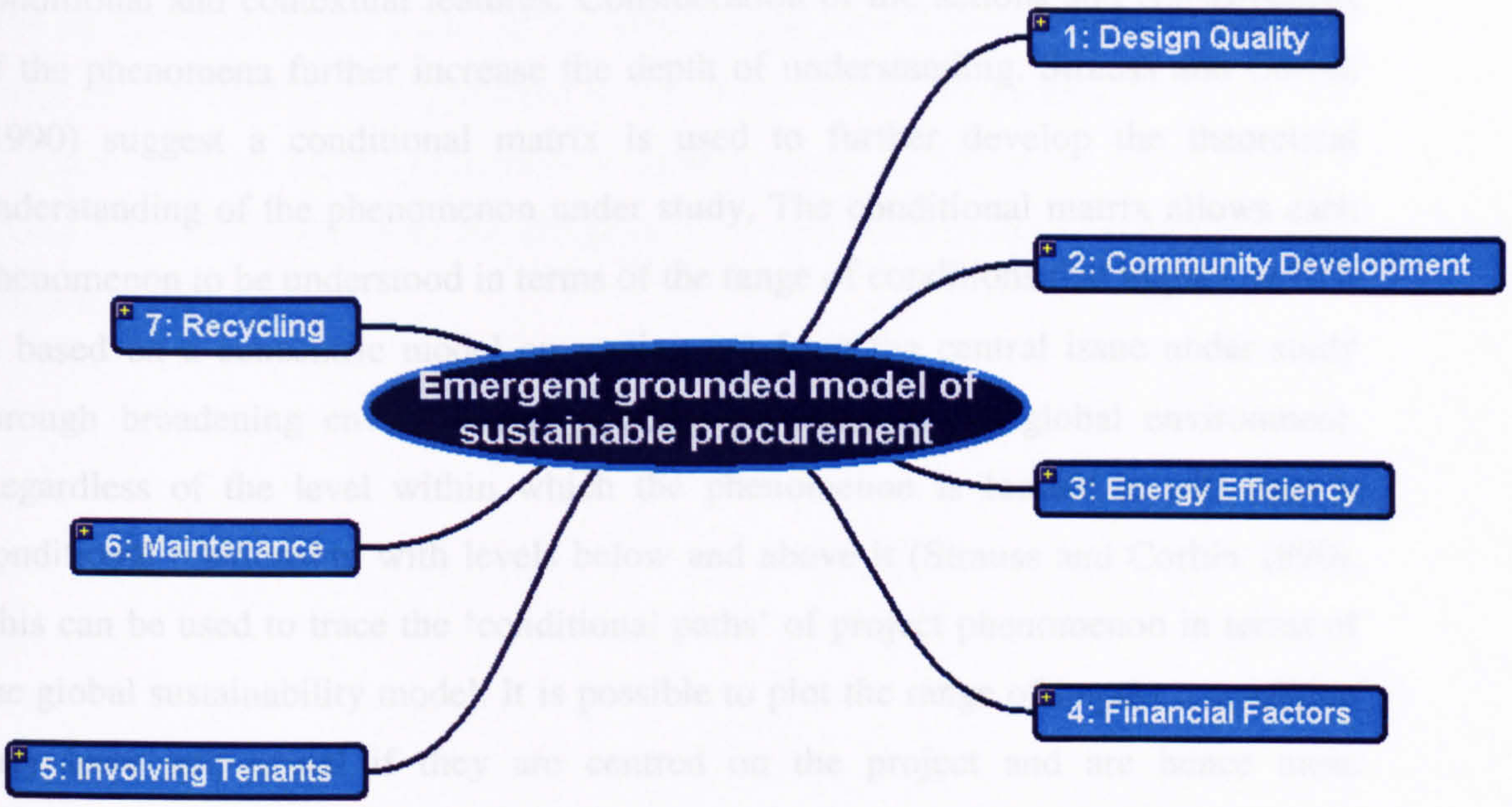


Figure 5-41: Emergent Grounded Model of Sustainable Procurement

The emergent grounded model presents a set of phenomena that relate the concept of sustainability to the procurement of social housing. The concepts that form the paradigm models constitute elements of a grounded theory. The complexity of the sustainability is apparent in the many connections between these phenomena. This complexity is revealed in the development of a conditional matrix.

5.7.5 Conditional Matrix

The conditional matrix makes use of systems approach to understanding sustainability (Clayton and Radcliffe 1996). The matrix represents a number of inter-connected systems with the procurement system at its core. Use of the conditional matrix generates an understanding of the way in which the components of the grounded theory model impact on the wider environment. The paradigm models set out the seven phenomena represent a view of sustainability grounded in the procurement process. Each of these phenomena has been analysed in terms of its conditional and contextual features. Consideration of the actions and consequences of the phenomena further increase the depth of understanding. Strauss and Corbin (1990) suggest a conditional matrix is used to further develop the theoretical understanding of the phenomenon under study. The conditional matrix allows each phenomenon to be understood in terms of the range of conditions that impact on it. It is based on a concentric model emanating out from the central issue under study through broadening environmental settings outwards to the global environment. Regardless of the level within which the phenomenon is located it will have a conditional relationship with levels below and above it (Strauss and Corbin 1990). This can be used to trace the 'conditional paths' of project phenomenon in terms of the global sustainability model. It is possible to plot the range of impact a condition may have and reveal if they are centred on the project and are hence more controllable or far reaching and outside the immediate control of the procurement system.

Each phenomenon was defined by a range of causal and intervening conditions, and actions or consequences arising from it in the development of the paradigm models. The conditional matrix allows the phenomena to be plotted in terms of where this impact is experienced. The closer the impact to the project environment the more likely the procurement system is able to manage the impact. By understanding how an aspect of sustainability impacts upon the project, organisation, community or at

the broader level of regional, national or global impact it is possible to see the impact of certain features. The conditional paths systematically relate the features of sustainability. The contextual and conditional features and the actions and consequences of the phenomena are plotted on the matrix and it is then possible to gauge the focus of the impact.

The conditional matrix reveals further complexity in the paradigm models. In general for each feature the impacts are concentrated towards the centre of the matrix, but closer consideration reveals the impact that the different phenomena have at different levels. Some of the phenomena have a broad range of impacts. Some are more focused on particular levels of the matrix. By understanding the way in which features of the procurement system relate to the wider environment it makes it possible to unravel the complexity of decision making towards achieving sustainability.

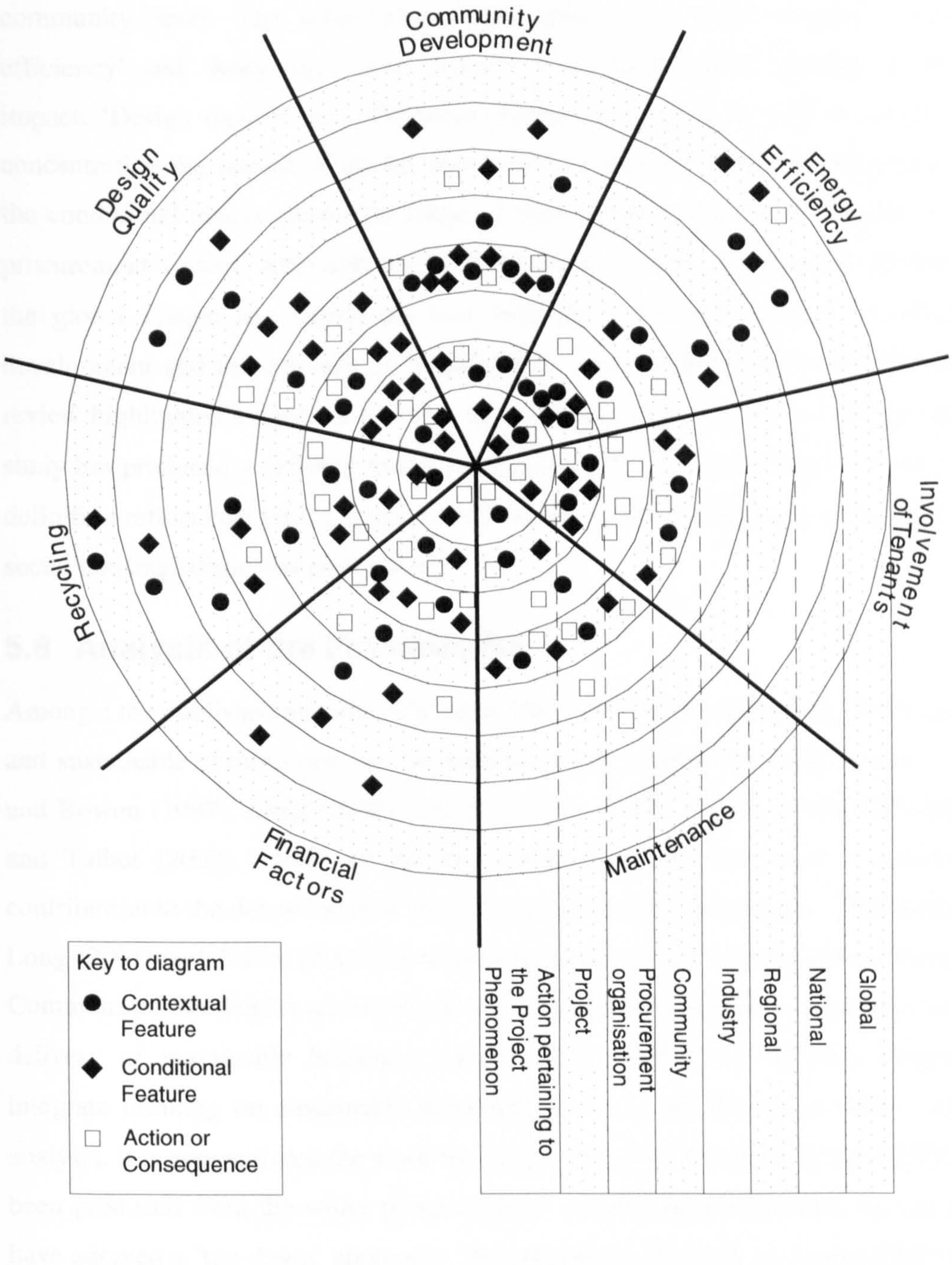


Figure 5-42 Conditional Matrix – Sustainability in the Procurement of Social Housing

The matrix shows that the phenomena of 'Maintenance' and 'Involving tenants' impact most closely to the project system. Most of the impacts are found at the community level. 'Community development' also has the majority of impact at

community level. The other phenomena have much wider impacts. 'Energy efficiency' and 'Recycling' have features from project level through to global impact. 'Design quality' and 'Financial factors' impact up to national level. The concentration the impact of all the phenomena is at project level. Interpretation of the conditional matrix shows the range of impact that sustainability has out of the procurement system. Although it is focused around project decisions it impacts on the global system and shows the link with the global definition of sustainable development and the delivery of sustainability in a building project. The literature review highlighted a need for defining sustainability at project level. This grounded study has produced a defining model of sustainability. To establish how closely this definition reflects the policy framework an analysis of key publications in use in the social housing sector was conducted.

5.8 Analysis of the Frameworks

Amongst the published material relating to the principles of sustainable development and sustainable construction are the following key or seminal works, namely, Hill and Bowen (1997), Long (2001), DETR (1999), DETR (2000), BEQUEST (2001) and Talbot (2002). Each of the key works indicated has made a significant contribution to the debate on how best to deliver sustainable projects. The works of Long (2001) and Talbot (2002) have been adopted by the Housing Corporation and Communities Scotland respectively, as the core of their guidelines or toolkits for the delivery of sustainable housing projects. The BEQUEST network sought to integrate thinking on sustainable development on a pan European basis. Upon analysis, it is apparent that the work by Long (2001) and the work by the DETR has been produced from the wider perspective of sustainable development and as such have adopted a 'top-down' approach. In comparison the work by Talbot (2002) has been approached from a 'bottom-up' perspective of construction project delivery but it has been produced in such an all embracing manner that the detail it has generated means that from a practical level it is a guideline or toolkit that has limited application. This comparative amount of detail can be seen from the analysis

indicated in Table 5.1. This table takes each of the principal reference material in turn and reveals the differing layers of detail in which it suggests sustainable housing projects need to be delivered. As can be seen the practical guides produced by Long (2001) and Talbot (2002) that have been used as the core of practical toolkits by the Housing Corporation and by Communities Scotland have the most amount of low level detail and the least amount of high level or principal groups of features. It is suspected that such an approach encourages a tick sheet approach to the assessment and delivery of sustainable housing by practitioners on the ground rather than an approach that encourages shared understanding and common ownership.

Table 5-1: Principal Features – Theoretical Analysis (High/Inter/Low Levels)

Source	Application	High	Inter	Low
Hill & Bowen	Construction Management & Economics	4	-	26
Long	Housing Corporation	-	10	49
DETR	Sust Development Indicators	3	15	-
DETR	Qual Life Indicators	3	16	-
Hamilton & Curwell	BEQUEST Process Protocol	4	15	56
Talbot	Communities Scotland	-	5	73

Table 5.1 reveals that there are a limited number of high level features or nodes that have been advanced in the principal reference material related to this topic area. Upon analysis the following were identified as being the common principal features, namely [1] social issues, [2] environmental issues, and [3] economic issues. Other features identified at such high levels were technical and institutional matters and it was resolved to treat these matters as being related to the wider 'context' in which an individual construction project could be delivered.

This high level analysis allows the following theoretical proposition to be developed. A sustainable housing project is procured with concern for the continual

improvement, development or enhancement of societal, environmental and economic resources within the technical or institutional context in which the project is to be delivered".

An analysis of the intermediate features suggested in the material indicated in Table 5.2 was then undertaken to establish, in theory, the main sub-nodes that would be relevant to each of the main nodes identified above. The principal features are indicated within each of the seminal works and the development of related sub-nodes that have been brought together presented as a theoretical data analysis framework.

Table 5-2: Theoretical Nodes (High Level) & Sub-Nodes (Intermediate Level)

Nodes	Housing Corporation	DETR Sust. Indicator	DETR Qual Indicator	BEQUEST Process Protocol	Sub-nodes
[1] Societal	Area – reputation people, Neighbourhood				[1.1] Neighbourhood characteristics
	Social exclusion - (unemployment, income, death rates)	Poverty / social exclusion			as above
	Crime – anti social behaviour	Crime		Safety / security	[1.2] safety/security
	Social cohesion – community spirit, well being	Education / health	Health / education	Health & well being	[1.3] Health & well being (indiv)
	Community mix – involvement		Empowerment culture, skills	Community involvement	[1.4] Community empowerment
[2] Environment Node	Quality of environment				[2.1] Built environment surroundings
	Housing quality/design/layout	Quality of housing			[2.2] Design quality / layout
		Climate change/air quality	Natural resources	Natural resources	[2.3] Maximise natural resources
		Land use		Land use	
		Waste	Mimimise waste		[2.4] Minimise waste
		River quality	Limit pollution		
		Wild life	Protect diverse nature	Biodiversity	[2.5] Protect / flora / fauna
[3] Economic Node	Current demand		Local needs	Building stock characteristics	[3.1] Asset desirability
	Long term demand				
	Access / transport	Road	Access	Transport /	[3.2]

	traffic		utilities	Accessibility
	Economic output	Add to local economy	Production	[3.3] Business Development Opps
	Investm't		Finance	
	Employment	Env awareness of business		[3.4] Employment Opps

The analysis of the frameworks establishes the theoretical background of sustainability in social housing procurement. The policy frameworks are developed to further the delivery of sustainability. Their status with the housing agencies is prominent within the range of resources available to social housing providers. They aim to link the understanding of sustainable development at national and global level to the delivery of sustainability through the procurement system. The issues that constitute the framework and policy model (Figure 5.43) are compared with the grounded model to determine the link between policy and practice in the following section.

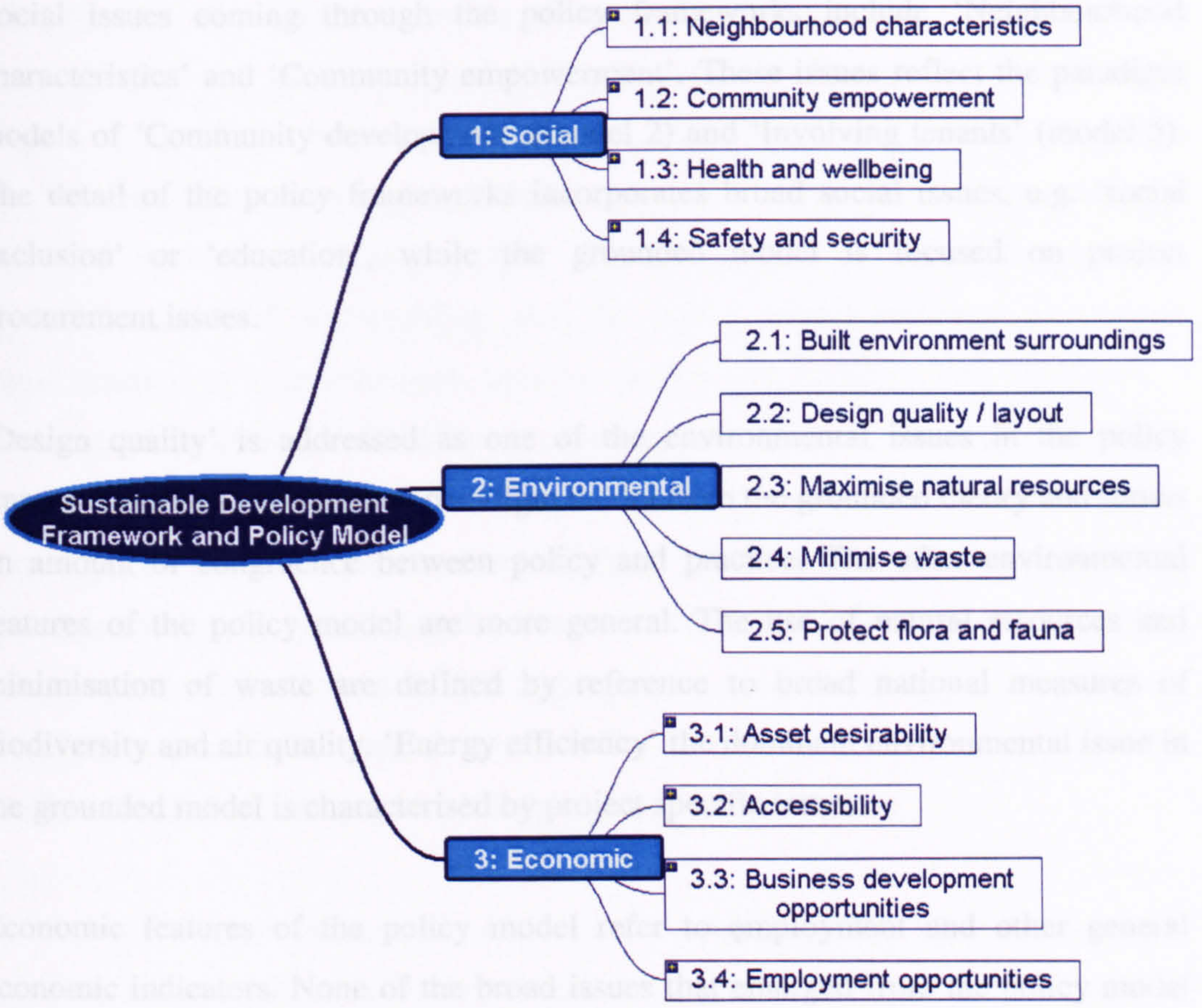


Figure 5-43: Policy and Frameworks Model

5.8.1 Comparison of the interview and framework analyses

The seven paradigm models represent a preoccupation with project-centric issues. Analysis of the policy frameworks reveals a higher level concern. The issues revealed in the policy model reflect the top down approach encapsulated in their development. Broad issues of 'Health and well-being' and 'Employment' give the frameworks a regional perspective. This moves some aspects of the policies away from the control of the procurement system. The top down approach has managed to filter down to some of the issues that are emerging out of practice.

Social issues coming through the policy frameworks include 'Neighbourhood characteristics' and 'Community empowerment'. These issues reflect the paradigm models of 'Community development' (model 2) and 'Involving tenants' (model 5). The detail of the policy frameworks incorporates broad social issues, e.g. 'social exclusion' or 'education', while the grounded model is focused on project procurement issues.

'Design quality' is addressed as one of the environmental issues in the policy frameworks. This is prominent paradigm model from the grounded theory and shows an amount of congruence between policy and practice. The other environmental features of the policy model are more general. The use of natural resources and minimisation of waste are defined by reference to broad national measures of biodiversity and air quality. 'Energy efficiency' the dominant environmental issue in the grounded model is characterised by project specific issues.

Economic features of the policy model refer to employment and other general economic indicators. None of the broad issues that emerged from the policy model relate to the grounded model phenomena. The issue of asset desirability emerged at the lower levels of the grounded model, through a number of the paradigm models. The underlying theme of matching aspirations (feature 8.3) relates to the broader issue of demand for the property.

The comparison of the grounded model with the analysis of the frameworks has confirmed the gap between policy and practice. The policy frameworks bear a strong resemblance to the global definition of sustainable development. The practical delivery of sustainability through a building project should be guided by these policies. Evidence shows that the interpretation of sustainability differs markedly to the policy definition of sustainable development. The understanding of sustainability by those involved in the procurement of social housing does not reflect the policy documents. The extent of this difference opens up the possibility of varied

interpretation. The literature review (Chapter 2) identified the filters present to determine the way in which sustainability is delivered through a housing project (Figure 2.5). This proposition suggests that interpretation of sustainable development policy is an important influence on the way in which sustainability is delivered through a building project. The substantial difference between the grounded model of sustainability and the policy model indicates a complex transformation of comprehension between policy and practice. This represents a fundamental problem for the delivery of policy into practice. The leap that occurs between policy and practice represents a 'black box' process. The exact rational for certain phenomena or features emerging from the grounded model is difficult to trace back to the policy. It is not clear that sustainable development policy is actually being implemented as intended. This highlights the need for further research into the broadly accepted definitions of sustainability across the social housing sector to confirm the findings of the grounded approach.

Collectively the two components of the study help to clarify the phenomenon of sustainable development and how it relates to the procurement process. The analysis of the qualitative data and the existing frameworks identifies significant gaps in perception and understanding. The conversations with stakholders in the procurement process present issues that are of importance to individuals at project level. It is this aspect of the research that is being used to develop understanding from a bottom up approach. The frameworks present the policy level issues that are considered integral to sustainable development. This part of the research identifies the key aspects of sustainable development from a top down approach. An immediate problem that has been identified by the first phase of research is the difficulty in translating policy into practice. There does not appear to be a mutual understanding of the term sustainability and this generates a clear problem for the overall goal of sustainable development.

5.9 Emerging Grounded Theory

This phase of research has aimed to develop grounded theory of sustainability from a project perspective. The grounded theory emerging from this process has provided a set of paradigm models that represent the views of stakeholders in social housing procurement. The components of the theory are presented in the paradigm models (section 5.7.4) that collectively present a grounded model of sustainability.

5.9.1 Advancing the theory

The study has revealed significant differences between the sustainable development frameworks and the areas that are important to sustainable social housing procurement at project level. The first phase of analysis has developed an emergent propositional model of sustainable development grounded in the social housing sector.

Comprehension is achieved when enough perspectives have been gathered to produce a verifiable understanding of a phenomenon. In grounded theory samples are taken from events and incidents that are indicative of theoretically relevant concepts. This process must continue until theoretical saturation of categories is achieved. This occurs when the addition of new information achieves no change in the existing understanding. Glaser (2001:57) believes grounded theories can be constantly modified to reflect the changing environment they are grounded in. This suggests that a grounded theory is essentially substantive and will develop incrementally. The emergent grounded theory represents the perception of sustainability within the procurement of social housing. The concept of sustainable development is evolving in this sector and the grounded theory provides a current view of sustainability. This theory provides an in-depth understanding of sustainability not previously developed.

5.10 Summary

The frameworks for the sustainable development of social housing focus on a wide range of issues. They have been developed from a top down approach and tend to include regional issues. RSLs are limited in their influence over a large number of the issues identified in the frameworks. They primarily exist to provide housing and any wider agenda is somehow out with their remit. However, all those interviewed in the social housing sector, displayed empathy for wider social and economic community issues. The operational and funding conditions experienced by those involved in social housing procurement, placed constraints on their ability to address these aspects of sustainability.

The definition of sustainability has become a recurrent problem. There have been numerous attempts to find a workable definition. All too often sustainable development is addressed by one group of players in the procurement process. For achievement of long-term sustainable goals it is essential that agreement is reached by all parties as to what sustainability means for a particular project.

The concept of sustainability has emerged into the social housing sector driven by policy that seeks to incorporate global and national definitions of sustainable. The aim is that housing associations incorporate the policy level aspirations into the procurement of social housing projects. It is clear from the literature that there is uncertainty over the ability to translate these aspirational goals into deliverables at project level.

The ideas that emerged from the grounded theory approach produced a rich picture of social housing procurement from a bottom up approach. The differences that can be seen between the frameworks of sustainability and the project level perceptions provide a measure of the distance between what is agreed at a strategic level and what is perceived by those involved in the delivery of the social housing.

The propositional model generated by the use of grounded theory method showed significant differences between the perception of sustainability by those involved in social housing procurement and the policy documents intended to guide them. The frameworks and policies are clearly developed out of the internationally recognised definition of sustainability. They are organised into the three areas of social, economic and environmental sustainability. They also refer to issues that are more relevant to the end product of the procurement phase, the housing and community itself. There is little direct reference to the issues that have emerged from the grounded theory study.

The procurement process is the system by which sustainable social housing is delivered. SSM asks that the system is modelled and compared with real world situations to identify areas where desirable change could be made. The following chapter presents the next phase of research used to test the grounded model of sustainability within social housing development sector.

5.11 Reflections

Glaser (2001) suggests that it that the skills required to develop a grounded theory develop with experience. Conceptualisation is a fundamental part of the approach and it is essential that the researcher does not revert to description of what has been observed. As a novice to grounded theory, the whole process of 'learning by doing' has been a challenge. Conceptualisation is not a methodical process. It requires a degree of creativity and focusing in and out of the data.

The use of NUD*IST software was useful in sorting and coding data. When it came to representing the models the software had limitations in its ability to represent the emerging findings of the research. A piece of software was investigated for its ability to represent the data in a more coherent and understandable model. Mind Genius was selected because of its ability to display the emergent categories and

their relationships clearly and logically. The use of this software became more than a graphical tool. It allowed to grouping of categories in a similar way to NUD*IST. This resulted in the use of Mind Genius as an analytical tool in conjunction with the hand coding and axial coding being carried out using the NUD*IST package.

In both cases the software provided enormous assistance in handling the relatively large amounts of data that had been collected during the interviews. The limitations of the software became clear and it was recognised that however helpful software may be, it cannot replace the conceptualisation process that goes on in the researchers mind.

The format of the interviews was flexible. The agenda was minimal with the intention of enabling the participant to move around the topic freely. They were asked to express their opinions on sustainability with regard to the procurement process. This approach although recommended as a means to gathering rich data allowed the participants to express views on an extremely complex subject in very different ways. It was necessary on a few occasions to redirect the conversation closer to the main topic when the thread of the conversation meandered too far away from the procurement process.

At times the grounded theory approach proved overwhelming. Early on in the data analysis, a large number of categories had been generated and there did not seem to be any 'patterns' emerging. Loss of confidence in what was being achieved was a barrier to progress in the work. The belief in grounded theory is sustained through the confidence in the concepts being verified. Categories began to emerge and the use of both hand coding and computer software helped to organise the ideas. Confidence was restored when it became clear that the concepts were being confirmed by the second round of interviews, which ultimately produced the paradigm models.

Chapter 6 Sustainability and Partnering practice in the Social Housing Sector

6.1 Introduction

The previous chapter presents an emerging grounded theory of sustainable procurement in the social housing sector. The understanding of sustainability within the project environment appeared to have distinct differences to the common understanding of sustainability expressed in policies and frameworks. The emergent features of the practice based model revealed distinctions between housing associations of different sizes. The conceptual framework calls for testing of models within real world situations. A large scale survey was then conducted to establish if these distinctive positions revealed trends across the housing association sector. The data was collected from developing organisations from across the UK. The data collected was both quantitative and qualitative. This approach provided two benefits. The results could be used to establish significant profiles for different types of organisation and provided triangulation of the initial qualitative study.

This second phase of research involved testing the features of the grounded model of sustainability with the UK housing association population. In this chapter the term RSL (Registered Social Landlord) is used in place of HA (Housing Association). This is the technical classification used by the housing agencies to describe housing association and was the term used in the questionnaire. The aim of the survey was to establish if trends existed for different types of organisation. The survey focused on the areas of sustainability and partnering for the procurement of social housing projects. This chapter reports on the survey that was conducted amongst RSLs and presents the results. Statistical analysis was conducted to establish significant relationships between features of sustainability. The analysis was continued to allow conclusions to be drawn on the different sized organisations that operate in the social housing sector. The data reveals a snapshot of the industry and allows a comparison

to be made with the propositional model developed in Phase 2 (chapter five) of the research. The survey is then used in combination with the grounded theory study to establish the third phase of research.

6.2 Relationship to Conceptual Framework

SSM requires that models are developed and then tested in the real world. This process allows the researchers and participants to establish what changes are desirable and feasible to improve the system. The soft systems approach specifically calls for comparison *between the models and real world.* The model is developed on a logic driven process of enquiry, in this case, grounded theory approach. The model of sustainability represents a well developed view of sustainability from within the procurement system. The model is then compared with the perceptions of sustainability found in the population of RSL development managers across the UK. This aims to establish differences between the model and the real world that might be used to manage desirable change.

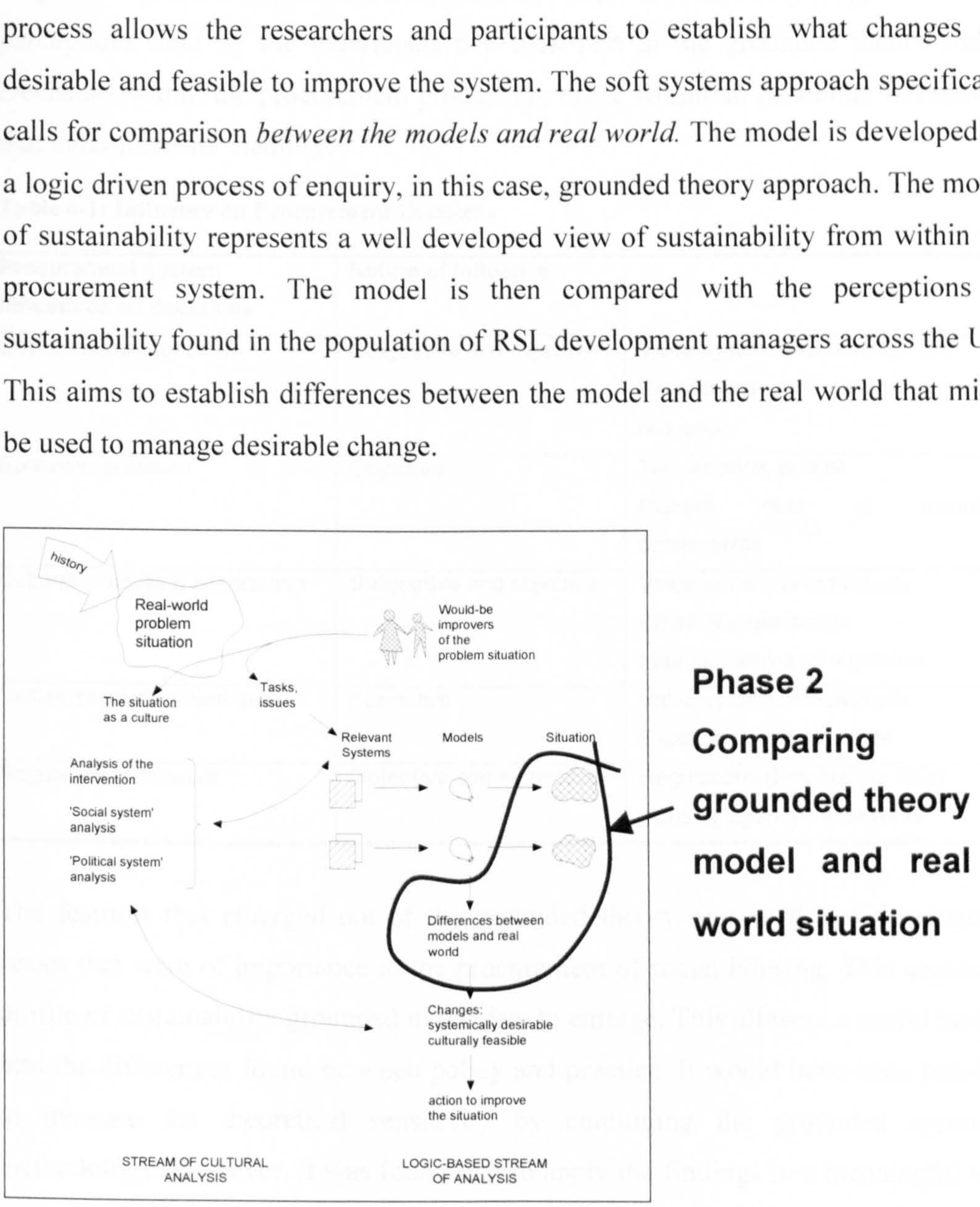


Figure 6-1: Phase 2 research within SSM Framework

6.3 Justification of research approach

The grounded theory approach produced an emergent theory of sustainability. A full grounded theory could be pursued by iterating the process until theoretical saturation had been reached but it was decided due to the desired research outcomes to adopt an alternative research approach. The procurement system is created from a wide range of influences (Table 6.1). Subjective and objective reasoning is apparent in the perceptions held by the individuals that took part in the grounded theory study. Decisions within the procurement process are made within an economic framework that determines its viability.

Table 6-1: Influence on Procurement Decisions

Procurement system Influences on decisions	**Nature of influence**	
Environmental concerns	**Subjective** and objective	Value system based on opinion Regulations on emissions/ waste reduction
Economic pressure	Objective	Tender price, budget Current cost of materials, components
Cultural of housing association	**Subjective** and objective	Value system of individuals Ethos of organisation Internal policy and regulation
Culture of procurement team	Subjective	Value system of individuals Experience and expertise
Regulatory framework	**Objective** and subjective	Regulations (Eco-homes, HQI) Housing agency frameworks

The features that emerged out of the grounded theory presented a wide range of issues that were of importance to the procurement of social housing. This enabled a profile of sustainability grounded in the data to emerge. This allowed a useful insight into the differences found between policy and practice. It would have been possible to increase the theoretical sensitivity by continuing the grounded approach methodology. However, it was found that to apply the findings in a meaningful way to the procurement process, it would be necessary to quantify the features in some

way. During the procurement process decisions on how to allocate the budget across the project is determined by the priorities emerging from the individual circumstance of a project. This led to adoption of a quantitative approach in order to prioritise the features of sustainability and gauge the most and least important areas. This quantitative approach not valid for use within grounded theory suggested the use of a much larger sample and therefore an alternative data collection tool. Phase two of the research therefore consisted of a questionnaire survey carried out amongst the UK housing association sector.

6.4 Research Methodology

6.4.1 Survey

A questionnaire survey is a low cost and relative quick way of eliciting a response from a large population (Wilson 1996). The object of Phase three of the research is to test or verify the theory that has emerged from the grounded theory study. It was important that the features emerging from the grounded theory study could be tested for their relevance. Secondly the element of prioritisation not captured explicitly in the grounded theory approach was sought by the use of a survey.

The survey used to collect data for phase two, asked respondents to consider the features of sustainability and consider them in terms of their relationship to its delivery. This was aimed at uncovering the priorities that the social housing sector placed on the features of sustainability. The fourteen features of sustainability from the phase one research are tested for there relevance and importance to the overall concept of sustainability. The relationships developed in the grounded model were used to develop seven components of a theory. This theory is further tested in the analysis of the quantitative data collected through the survey.

Empirical research involves the observation of real world experiences, evidence and information. In a research context this evidence and information is referred to as 'data'. On its own data has no real meaning. It is only when it is interpreted that meaning can be derived. Empirical research relies on the existence of a research question, data and the analysis of that data. The question must be capable of being researched or answered with data (Punch 1998). The validity and the quality of data are important concepts sometimes not given adequate attention. The quality of data is in a direct relationship with the quality of the research. Poor quality data will lead to poor quality research.

There is a process of constructive alignment between data and the research concepts that must be observed when designing the method of data collection (Figure 6.2). This alignment and its success or otherwise underpins the quality of the research.

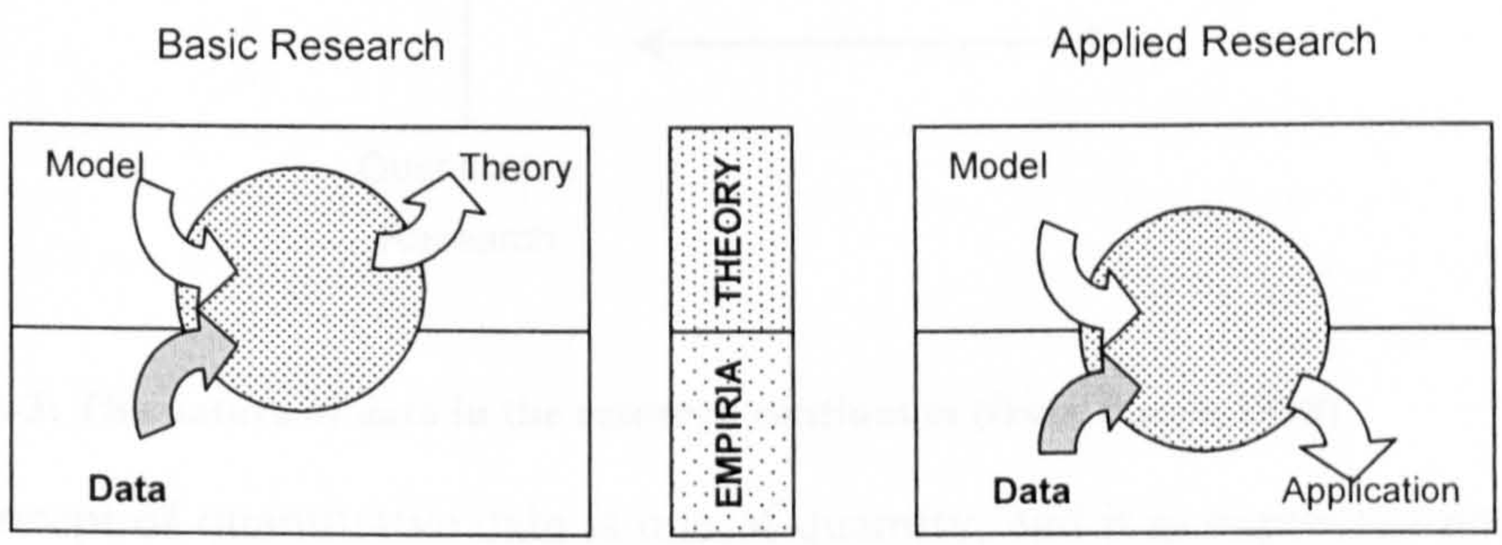


Figure 6-2: Position of data in the research process (from UIAH 2004)

The nature of data in research is directly related to the philosophical viewpoint of the research. Locke (1649) one of the founders of modern day empiricism stated that *"No man's knowledge here can go beyond his experience"*. Empirical research is founded on the assertion that knowledge may only be gained through experience and the induction of that experience. It is this experience that is interpreted in the form of research data. In this research data is collected in two ways. Qualitatively through the recording of interviews and quantitatively through the survey. The experience of individuals is captured in both data collection approaches. This experience provides

the material from which the models are created. The qualitative data has allowed a rich picture to develop and the quantitative data allows dimensions to be given to the picture

Punch (1998) describes research as lying on a continuum between pre-specified and unfolding (Figure 6.3). Data ranges from prestructured to not prestructured. The data may be quantitative or qualitative but the presence of data is an essential part of empirical research. Typically quantitative data would be found to the far left of this continuum while qualitative data occupies a much greater range.

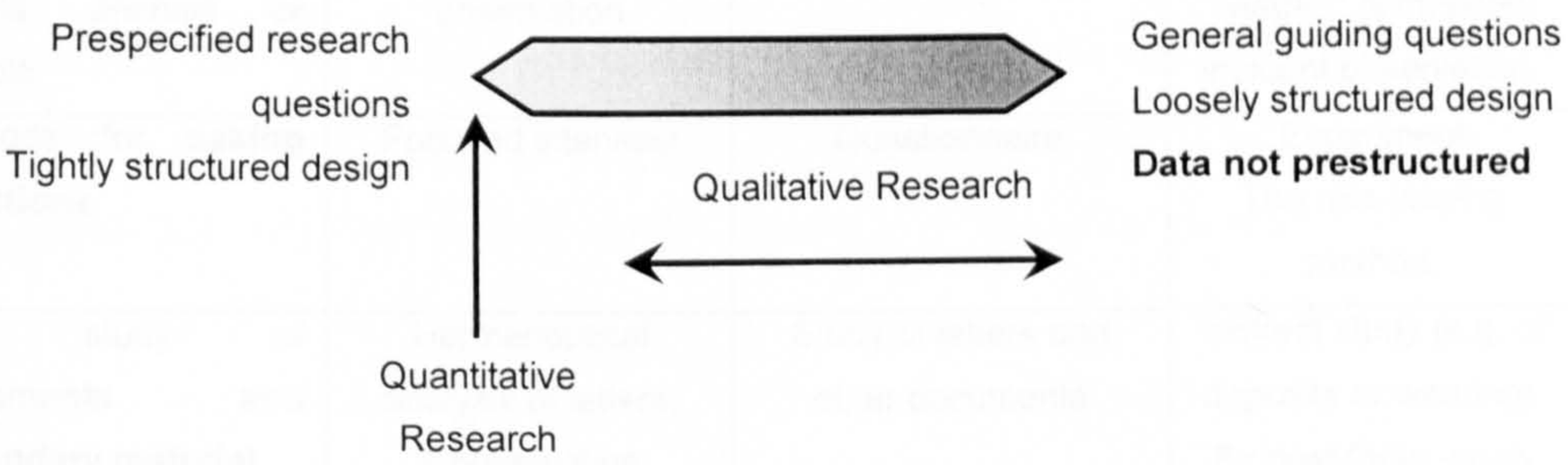


Figure 6-3: The nature of data in the research continuum (from Punch 1998)

The concept of quantitative data is one of quantity, and it is expressed numerically. Table 2 is an example of quantitative data. The use of numbers brings a structure to data and essentially involves the use of measurement, either counting or scaling (i.e. 0% to 100%). The main problem associated with quantitative data is that of adequate measurement.

Qualitative data is empirical information that is not numerical. It can lie anywhere along the continuum from prestructured to not prestructured and takes the form of people's words or the researcher's description of observation or experience (Sapsford and Jupp 1996). Mason (1996) argues that qualitative data is generated rather than collected. Interviews, documents, visual images can all be used as a

source of data, but it is the researcher's epistemological position that determines how that data is generated.

There are many methods to collect data. It is important that the most appropriate method is selected for a particular piece of research. Some methods of data collection or generation are set out in Table 6.2.

Table 6-2: Methods of gathering empirical data (from UIAH 2004)

	Explorative research	**Research as Revision of a Model**	**Hypothesis-based Study**
The study of **inanimate objects**	Documenting objects	Gathering Data for Analysis	Experiment
Methods for **observing** people, animals or objects	Non-systematic observation	Systematic observation	Experiment "Staged" (simulated) incident observation.
Methods for **asking questions**	Focused interview	Questionnaire	Experiment The role-playing method.
The study of **documents and secondary material**	Hermeneutical analysis of letters, Conversation sampling	Study of letters and other documents	Indirect study (e.g. of deposits or wearing). Ex post facto -study of existing files

A study carried out by EIRASS into the effects of data collection methods identified factors that influence data quality and validity (Ettema *et al.* 1996). Type of population, sample control, non-response, type of questions, complexity of questionnaire and available resources are some features affecting the value of the data. The study noted that there is limited research into data quality. There is also an increasing sophistication in model development coupled with the use of data which is not being critically assessed. It is clear that careful consideration must be given to data collection and how it fits into the overall research process.

6.5 Sustainability and Partnering in the Social Housing Sector: A Survey of Perceptions and Practice

6.5.1 Design of the Survey

Questionnaire Design

Oppenheim (1992) identifies fourteen steps in the design of a survey. These steps provide best practice guidance, from establishing the aim of the study, to analysing the results and writing the research report. The first three steps involve identifying the aims of the study, checking its relevance to existing literature and conceptualisation of the study to ensure that the aims and relevance of the survey are being addressed. The latter steps involve the design of the research instrument and the collection and analysis of the data. The main aim of the survey was to collect data from the real-world that could be used to test the propositional models developed by the use of grounded theory approach, reported in Chapter Five. This model proposes fourteen features of sustainability combined in seven paradigm models. The survey was first intended to test the relevance of the features that had emerged out of the grounded theory study. The survey provided the opportunity to collect additional information on the existence and maturity of sustainable development policies and perceptions of partnering and the link held with sustainability. This provides the contextual background to the way in which the features of sustainability are perceived.

The design of the questionnaire was developed around the core aim of testing the features of sustainability. Data is collected around three key themes. The first section of the questionnaire is used to define the RSL population parameters. The second and third sections collect information on Sustainable development policies and Partnering in procurement respectively. Because of the nature of the enquiry, many of the questions are designed to collect subjective responses. This type of question determined the type of measurement tool. The main variable was identified as the

size of organisation. This would allow the analysis to be carried out under the groupings emerging from the size of organisation. The original questionnaire contained ten questions (Appendix B).

Piloting the Survey

The survey was piloted amongst a small group of housing associations.. The respondents were asked to complete the questionnaire and make comments on the content, layout and rationale of the questions. A feedback sheet was included with the questionnaire in order to provide consistency in the responses. The questionnaire was piloted with fifteen housing associations from across the UK. The letter was sent to targeted individuals within the housing associations. Some of these individuals were personal contacts. This approach was adopted to gain the highest chance of a good response. Six responses were received (40% response rate). Each respondent completed a feedback sheet and the responses and comments were used to develop the final questionnaire. Some of the feedback referred to simple errors within the questionnaire design. Alterations were made to the layout and structure of some of the questions. The most significant change to the questionnaire was to the question relating to the development programme. Clarification was made on the definition of 'refurbishment' and the annual periods of construction were adjusted to match the social housing development cycle.

Graphically the questionnaire was developed to become more user-friendly. Responses were gathered in most instances by check box. The questionnaire was refined to take the feedback into consideration. The final questionnaire was tri-folded to fit in a standard DL envelope. The questionnaire was accompanied with a covering letter explaining the purpose of the research. Respondents were provided with a space to complete their contact details if they were willing to take part in further research. This group of respondents provided a database of contacts for the subsequent phase of research.

Sampling

A survey is concerned with collecting data from a relatively large number of respondents. Ideally data would be collected from entire population sets, but this is rarely possible. Instead researchers build models of the real world situation that attempt to provide an accurate representation of the phenomena under study (Field 2000). This is carried out with the use of a sample. A sample is defined by Schofield (1996) as a set of elements selected from the population. Due to the time and financial limitations of the study it was not possible to conduct the survey with all developing RSLs in the UK. The social housing sector consists of over eighteen hundred RSLs. The number of developing organisations amounts to more than half of this total. It was necessary to conduct this part of the research with a subset of the population, or a sample.

Sample Selection

The selection of a survey sample has significant impact on the quality of research that is output by the process. A sample is designed to represent the entire population and as such must reflect the characteristics of the population (Naoum 1998). RSLs are registered with the housing agencies and the information is publicly available. However, data is fragmented and not in a format readily usable for a mailing list. A commercial database was chosen that has been created to assist the social housing sector. The data allowed the compilation of a large volume of contact details in a short period of time. The database was used to select all developing RSLs with a stock of more than twenty dwellings. This resulted in a population of nine hundred and ninety eight. The scope of the population was confirmed by reference to the Communities Scotland and Housing Corporation databases. A comparison between the database population and the statistics held on the housing agency websites confirmed the validity of the population.

Sample selection can be grouped into two different approaches, probabilistic or non-probabilistic (Schofield 1996). The former group includes simple random sampling,

stratified random sampling and cluster sampling. The latter is also known as purposive sampling and implies some sort of intervention in the choice of the sample. A random sample selection method was chosen so that every element of the population had an equal and independent chance of being included. The database arranged the RSLs into alphabetical order and every third organisation was selected for inclusion in the survey sample. This approach reduced potential bias introduced by selecting the sample from geographically or size ordered databases of RSLs.

Sample size, error and non-response

The survey was sent to a three hundred and thirty two housing associations and a total of one hundred and twenty one questionnaires were returned. Three of these returns were from housing associations that were either no longer developing or no longer managing social housing projects. This left a sample of one hundred and eighteen. In defining the population it became clear that access to development managers within the RSL organisations on an individually named basis was going to prove time consuming. The questionnaire was instead addressed to *the development manager* in all cases. Three hundred and thirty two surveys were distributed on this basis.

Error and non-response to the survey are a contentious issue. Acknowledgement of the potential errors contained in the survey data is important to allow them to be taken into account during the analysis. Credible data includes error due to the nature of the data collection process. This may be caused by sampling frame defects; non-sampling error; inaccurate or incomplete response. This error is reduced by the use of a large sample. The first round achieved a response rate of 25%. This was considered an inadequate response rate and a second distribution was undertaken to all those that had not responded. The second round increased the total response rate to 36%. This response rate fell within the average response rate for construction management research surveys and was considered adequate. Dillman (1978) suggest that a high response rate is necessary to achieve good quality research. This view

while supported in principle is not necessarily supported in practice. There is no evidence to support the assertion that the high response rates are more reliable. Research carried out in the construction sector has typical response rate far less than is suggested by Dillman (1978). There is clear difficulty attempting to engage individuals from a population involved in a busy commercial environment. The number of valid responses was adequate to carry out statistical analysis and was believed to provide a reasonable representation of the survey population.

Data Analysis framework

> *Data are not something that exist, there to be collected and reported on. They are constructs....created through the questions asked.*
> (Swift 1996:174)

The data collected using the survey provided a set of empirical information on a range of issues including the existence of a sustainable development policy and the issues that were relevant within it. This data allowed an understanding of the views held in regard to sustainability across the population and also an understanding of different views held by sub-sets of the population.

The raw data were compiled within a Microsoft Excel spreadsheet and then imported into Statistical Package for Social Scientist (SPSS) to conduct the analysis. The analysis framework developed as part of the questionnaire design. Raw data must be transformed into variables that are used in the analysis process. Except for highly structured data it is necessary to explore the characteristics and structure of the data to enable a coding framework to develop (Swift 1996). Swift presents three approaches to coding: representational; anchored-in; and hypothesis-guided. The first approach is useful for the treatment of specific information (i.e. the number of units owned by a RSL). The second and third approaches are more concerned with data that expresses meanings and views. Each approach has been used depending on the nature of the question. The first section questions are largely collecting factual

information and therefore the coding is *representational.* The subsequent sections are largely to do with perceptions and meanings. The *anchored-in* and *hypothesis-guided* approaches were used depending on the exact nature of the question.

The questionnaire was concerned with the collection of perception and meaning in the subjective areas of sustainability and partnering. This type of attitudinal measurement suggests the use of open-ended questions. However the scale of the survey and the underlying aim of ranking issues prevented the use of this approach. Instead attitudinal measuring scales were used. The most commonly used scale is a Likert scale that provides a number of options for the respondent to select. This approach has the benefit or providing data that can be analysed using statistical techniques. The problem with measuring attitudes is that a high degree of error is found in the response. To overcome this, composite measurement of an issue or ranges of issues is suggested (Wilson 1996). This involves asking more than one question on a similar area in order to develop a theoretical construct. Within the questionnaire composite measurement is used on two occasions. Firstly it is used to explore the perception of the sustainable development policies. Two questions are asked: the first establishes the perceived balance of the policy; the second asks the relative importance of a range of features to the policy. By approaching the issue in this manner there is a greater chance of gauging an accurate response. Composite measurement is also used to gauge the link between sustainability and approaches to procurement. Two questions are strongly correlated and the responses can be used to construct a more accurate view on the issue.

Reliability and Validity

Reliability and validity are important aspects of data collection. The reliability of data is concerned consistency and validity is concerned with the data reflecting reality. Reliability of the data can be measured using Cronbach's alpha

6.6 Results

The following section presents the results of the survey. The response to each question is presented in turn. At the end of each section of the questionnaire an overview is presented before going on to the next section of results. Analysis of the results is presented in section 6.7.

6.6.1 Results Part 1 : Respondent characteristics

The first part of the questionnaire established the characteristics of the RSL in terms of the number of properties they owned and managed, where they operated in terms of locality and the scale and maturity of their development programme. The categories of housing represented the notional banding of RSL that is used by the Housing Corporation and Communities Scotland in their annual reporting process. Use of these figures opened the possibility of using the housing agencies statistics for further analysis.

Question 1 : How many units are owned or managed by the RSL?

The number of properties owned by each respondent's organisation is represented in Figure 6.4. 33% of responding RSLs owned between 2,500 and 10, 000 units. The other respondent groups were almost equal in size (between 12.5% and 15%). The only exception was the group of RSLs owning between 26 and 100 properties. This group accounted for only 6% of returned questionnaires.

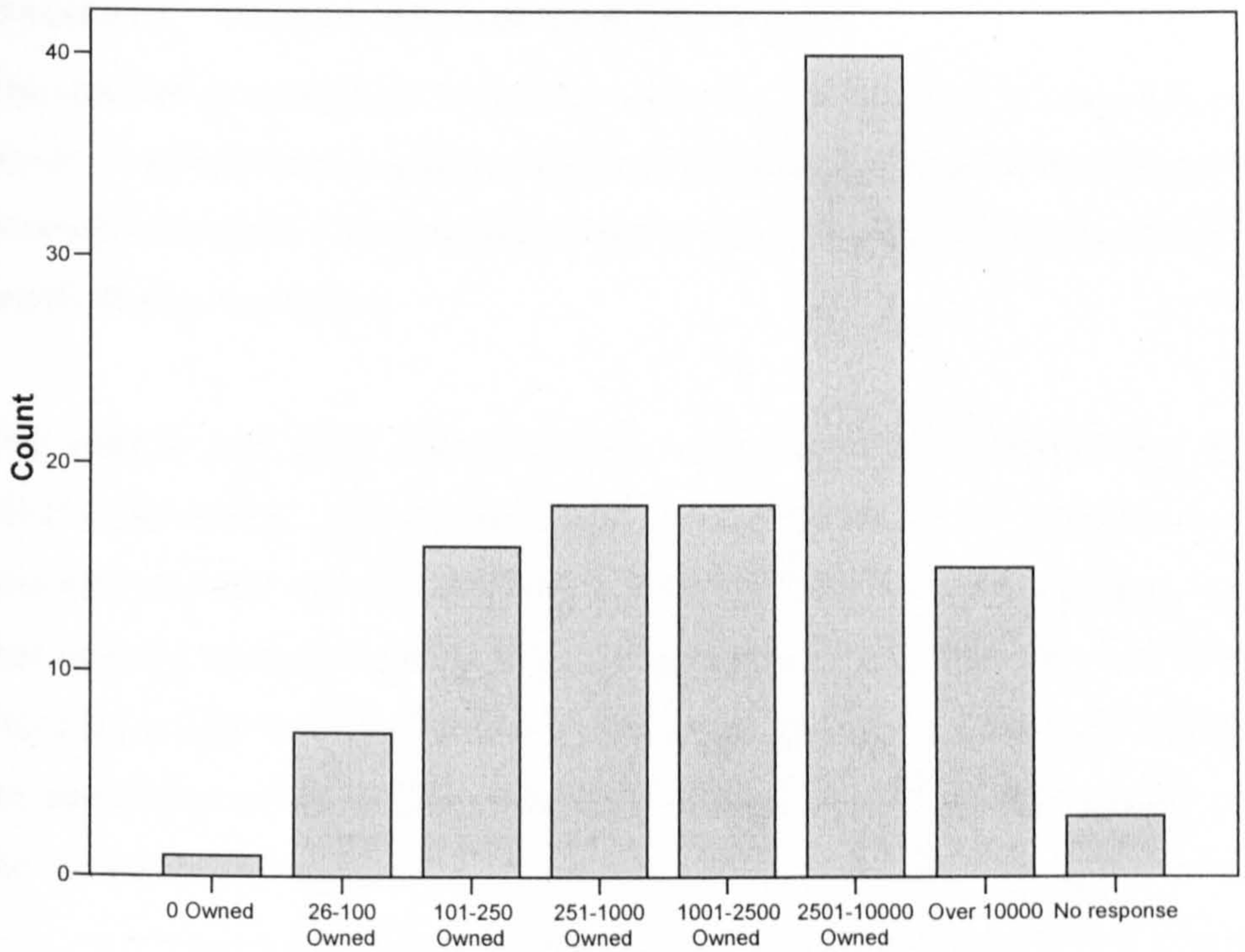


Figure 6-4: Number of units owned by the RSL

The demographics of the respondents correspond to the profile of RSL reported in the statistical returns of the housing agencies. Each category was represented by between 8% and 14% of the population of developing RSLs. A higher than expected proportion of response was received from RSLs owning over 10,000 properties (55%). There are several explanations for this. It may be a result of sample bias or a greater willingness or capacity in this size of organisation to become involved in research. The results on the whole confirmed that the sample was representative of the population.

Table 6-3: Profile of the UK RSL sector (Source: APSR 2004 and Housing Corp PI 2004)

	Number of RSLs per number of Units owned					
	26-100	101-250	251-1,000	1,001-2,500	2,501-10,000	10,000+
All RSLs	32	42	201	156	212	29
Survey respondents	7	17	19	19	40	17

Question 2 Do you carry out development work?

The research is centred on the procurement of social housing. It is important that the survey is completed by representatives of organisations that are actively involved in development work. This question sought to verify that the respondents were actually involved in procurement.

The sample had been selected from a database that indicated that they were developing RSLs. This is confirmed by the response to Question 2. 87% of respondents were actively involved in developing new social housing. Of the 13 % that claimed to be not developing, a small number indicated that they were in fact planning or had developed properties in the last year (see question 3). This increased the percentage of those RSLs that were developing to 92%. This further confirmed the validity of the sample.

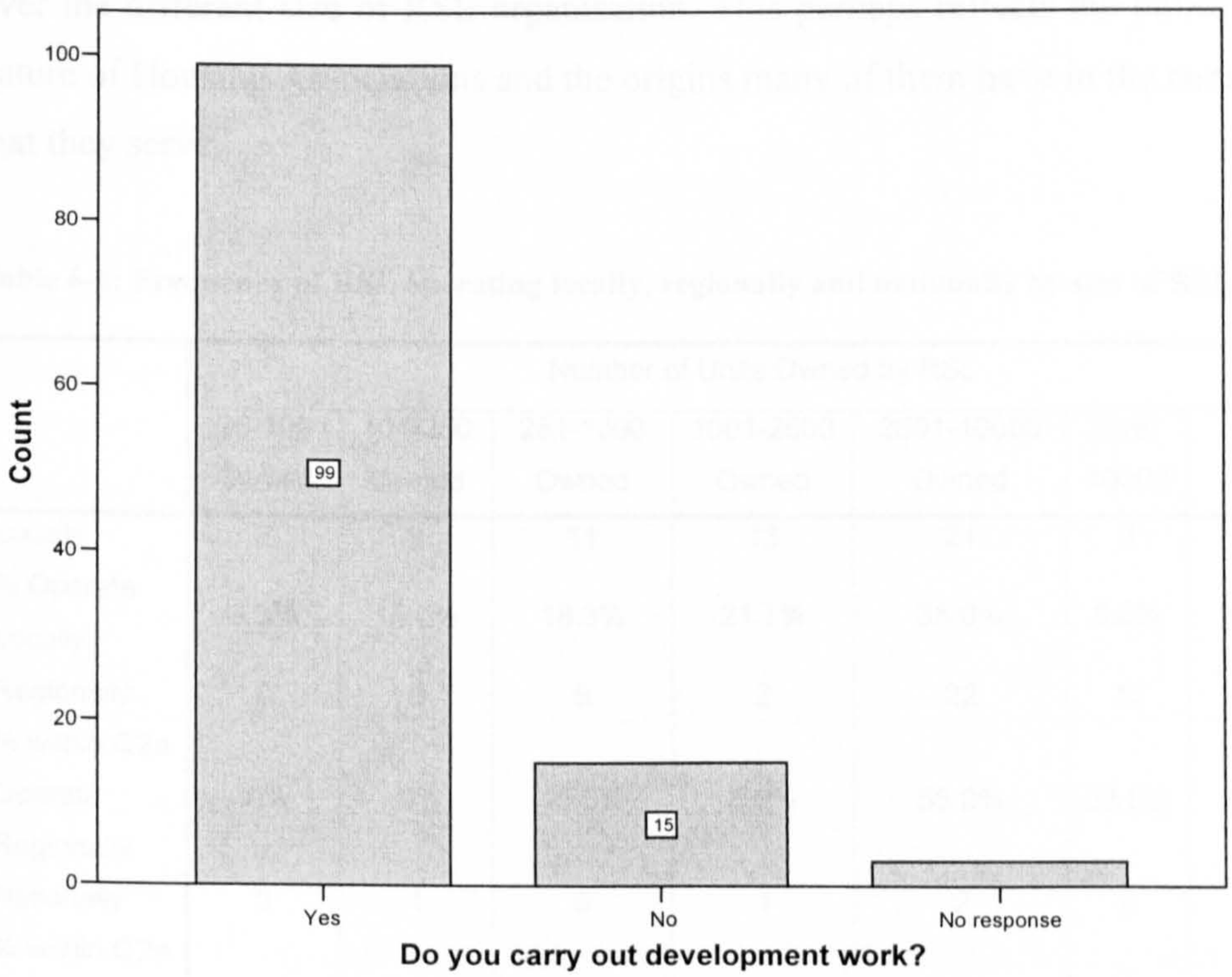


Figure 6-5: Number of RSLs involved in development work

Question 2a Is the development work carried out Locally, Regionally or Nationally

Of those that responded to this question, the majority were operating either locally (60) or regionally (40). Only 10 of the RSLs were operating nationally. As could be expected, the RSLs owning more than 10,000 properties accounted for 60% of RSLs operating nationally (6). More of the large RSLs claimed to be operating regionally. Surprisingly, one RSL with only 250 properties claimed to be operating nationally. This result is assumed to be a case of respondent error. Three medium sized organisations also claimed to be operating nationally.

80% of organisations operating regionally were RSLs with over 2500 properties. All sizes of RSLs claimed to be working within the locality of the communities they were serving. The percentage of RSLs operating locally was spread more evenly over the different size of RSL organisation. This perhaps reflects the philosophical nature of Housing Associations and the origins many of them have in the community that they serve.

Table 6-4: Frequency of RSL operating locally, regionally and nationally by size of RSL

	Number of Units Owned by RSL						
	26-100 Owned	101-250 Owned	251-1000 Owned	1001-2500 Owned	2501-10000 Owned	Over 10000	Total
Locally	2	9	11	13	21	3	60
% Operate Locally	3.3%	15.0%	18.3%	21.7%	35.0%	5.0%	100.0%
Regionally	0	0	6	2	22	10	40
% within Q2a Operate Regionally	.0%	.0%	15.0%	5.0%	55.0%	25.0%	100.0%
Nationally	0	1	0	1	2	6	10
% within Q2a Operate Nationally	.0%	10.0%	.0%	10.0%	20.0%	60.0%	100.0%

Question 3: How many units are / were / will be developed by your organization between April and March of Last year / Current year / Next year?

This question was designed to establish the maturity and nature of the development work undertaken by the RSL. The respondents were asked to specify the number of new units that would be developed (refurbishment or new build) over a three year period. In general more new build housing was being commissioned than refurbishment. Between 84% and 87% of respondents were or had been involved in development during the three year period in question. Less respondents (69% to 74%) were planning to or had created any new units by refurbishment[1].

Table 6-5 The incidence of development work over three year period (2002 – 2005)

	Cases				
	RSLs involved		Development size (units)		
	N	Percent	Total	Mean size	Std Dev.
New Development Last Year	103	85.1%	10451	105	137
New Development Current Year	105	86.8%	11416	112	116
New Development Next Year	102	84.3%	15346	155	120
Refurbishment Last Year	89	73.6%	2676	31	173
Refurbishment Current year	87	71.9%	2422	29	152
Refurbishment Next year	84	69.4%	2564	32	203

The new build programme was increasing in volume. This is not a surprise considering the policy of the UK government to invest in new social housing (ODPM 2004). As could be anticipated, the larger development programmes were

[1] The questionnaire differentiated between properties that were being maintained and properties that were being created into new units by refurbishing existing buildings.

carried out by the large RSLs. In all but one case, development programmes of greater than 200 units were only carried out by RSLs holding stocks of 2500 or more. The total number of properties developed under new build increased from just fewer than ten and a half thousand in the year prior to the study to a planned fifteen thousand four hundred units in the year following the study. Creation of new units by refurbishment remained fairly constant at two thousand five hundred (s.d. 124) units per year.

Overview of Respondent Characteristics

The data collected on the RSLs provides a profile of the sector. The data confirms that the majority of respondents were carrying out development work. The number of RSLs conducting development work for new build housing has remained constant over the last three years. The number of refurbished units had remained static and represented a much smaller proportion of development work. The volume of development work has increased each year for the whole sample. The large organisations have increased there share of the total number of new units. The small organisations are more likely to not be developing new units. It highlights the trend towards large organisations increasing their share of the development market.

6.6.2 Results Part 2: Sustainable Development Policies

The second part of the questionnaire collected information on the existence and profile of Sustainable Development (SD) policies. The first question was designed to establish if an RSL had a SD policy or planned to have one, and how long it had been in place. The maturity of a policy is of interest because an RSL that has operated a policy for a number of years may hold a position that differs from an organisation with a new SD policy, more heavily influenced by housing agency policy. The subsequent questions were designed to ascertain the balance of SD policies operated or planned by the RSL. The first of these two questions established the balance of social economic and environmental aspects the organisation gave to

its SD policy. The second question relates to the features of sustainability that had emerged out of the grounded theory study reported in chapter five. The respondents are asked to consider the importance of each feature and constitutes the main aim of the survey.

Question 4: Do you have a Sustainable Development policy?

Less than half of the respondents had a sustainable development policy. This is surprising considering that sustainable development is one of the key criteria for gaining funding from the housing agencies. The timing of the questionnaire coincided with the imminent requirement of RSL to operate a SD policy in order to be considered for development funding. At the time of the questionnaire there was not a requirement to have a SD policy. This might reflect on the need for regulatory input in order to effect change.

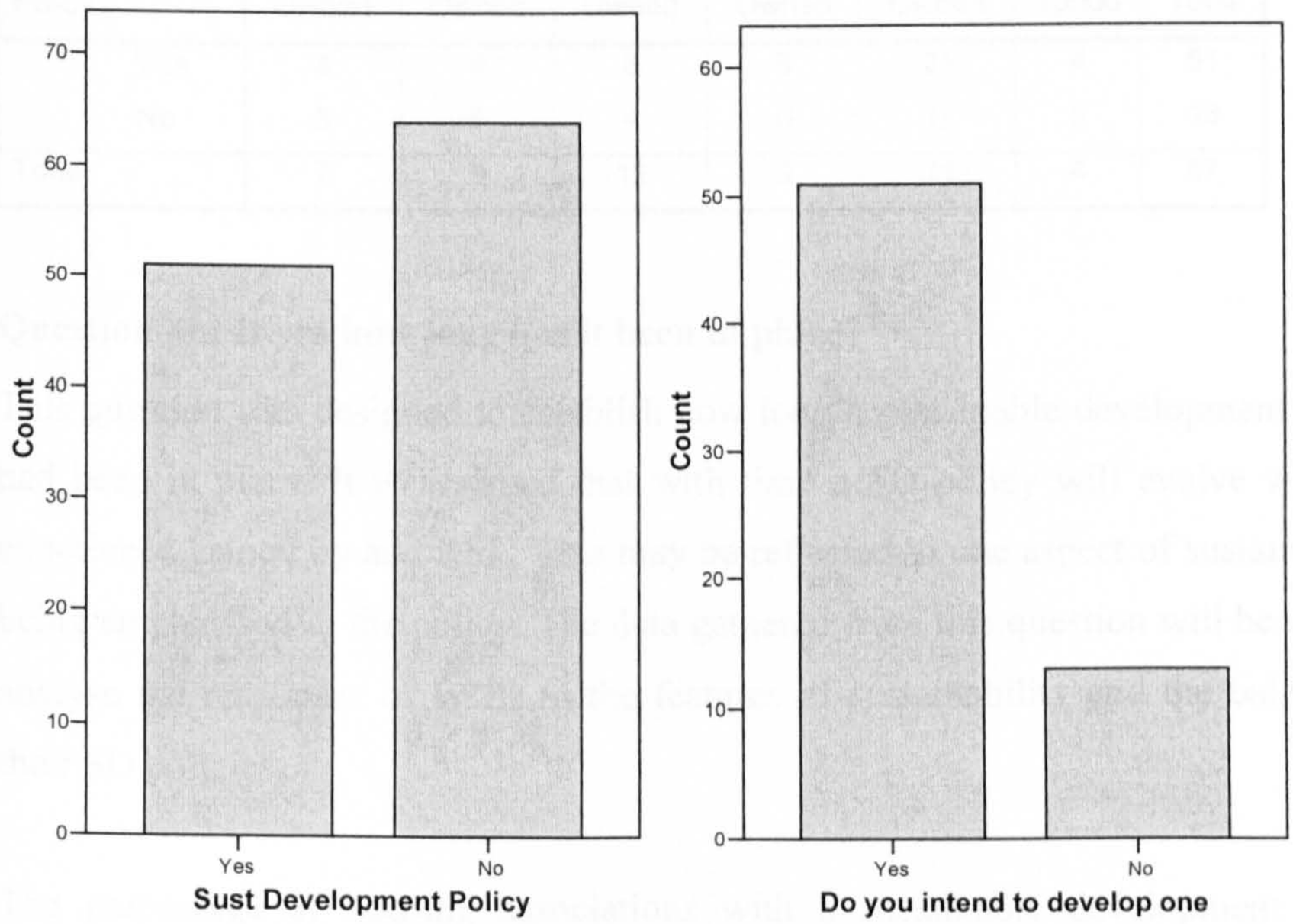


Figure 6-6 : incidence of SD policy (existing and planned)

Question 4a: If no, do you intend to develop one?

The RSLs that do not have an SD policy were questioned to establish if they planned to develop one. All of the larger developing organisations intended to develop a SD policy if they did not already have one. Only a few of the smaller organisations did not intend to develop a SD policy (13). Four of these are from medium sized RSLs which is surprising. This probably signifies that they do not intend to develop further housing in the future.

Table 6-6: RSLs intending to develop a sustainable development policy

Do you intend to develop a Sustainable Development Policy?	Number of Units Owned by RSL						
	26-100 Owned	101-250 Owned	251-1000 Owned	1001-2500 Owned	2501-10000 Owned	Over 10000	Total
Yes	4	4	8	9	21	4	51
No	3	5	4	0	0	0	13
Total	7	9	12	9	21	4	67

Question 4b: If yes how long has it been in place?

This question was designed to establish how long a sustainable development policy had been in place. It is assumed that with time a SD policy will evolve with the experience gained by and RSL. This may be reflected in one aspect of sustainability being emphasised in the policy. The data gathered from this question will be used to analyse the responses of RSLs to the features of sustainability and the balance of their SD policies.

The percentage of housing associations with a sustainable development policy increased with the size of the housing association (measured by number of owned units). However, the maturity of the policies did not have a direct relationship with the size of the organisation. 4 out of the 6 small RSLs had policies that were less than a year old, but one small RSLs had a policy that was between 3 and 5 years old.

Most of the respondents with a sustainable development policy had been operating with it for either for up to 1 year (47%) or between 1 and 3 years (44%). Two respondents had been operating sustainable development policies for over 5 years and one of the smaller organisations had a policy that was in existence 3 to 5 years. (Figure 6.7).

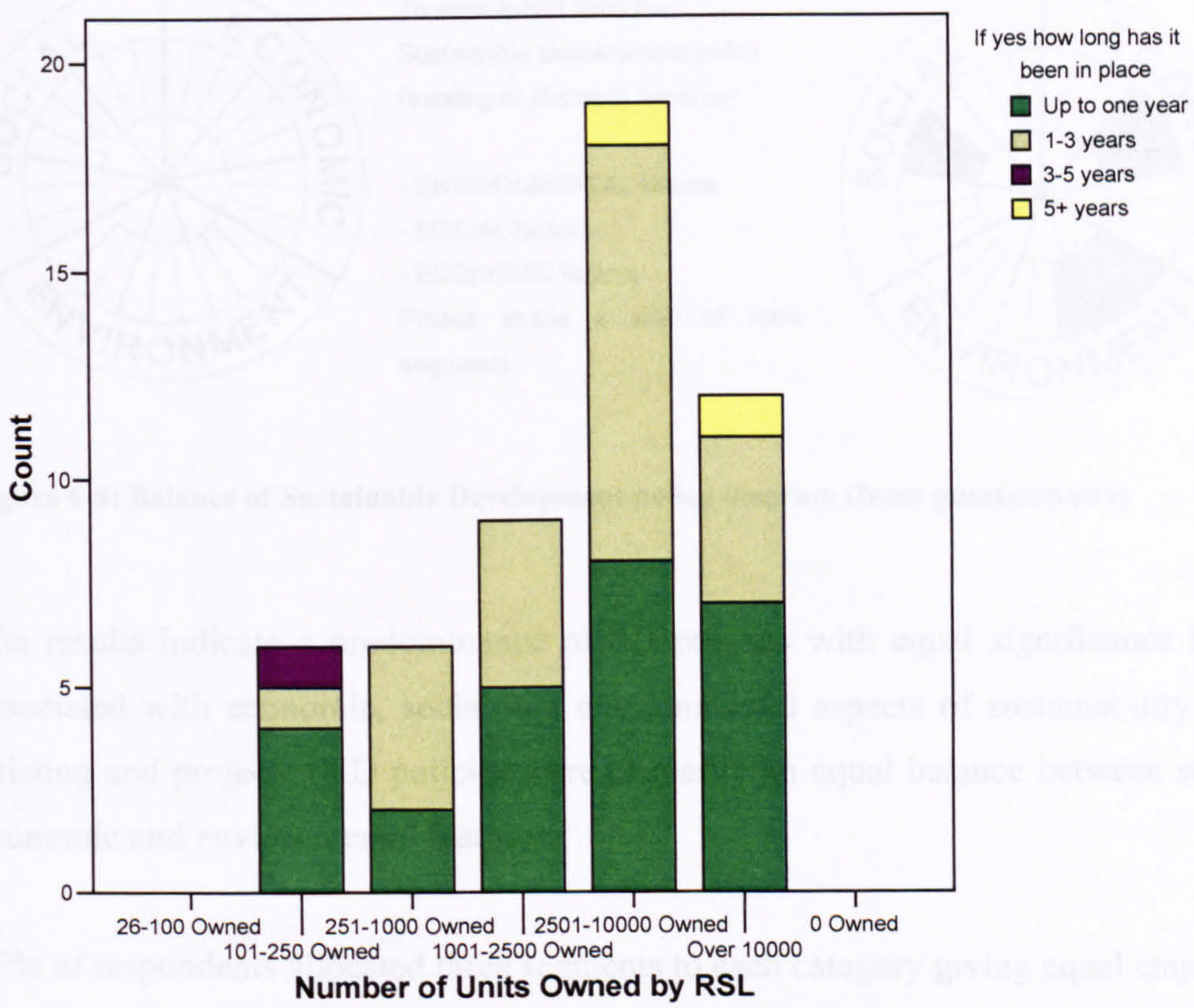


Figure 6-7: The relative maturity of sustainable development policies

Question 5: To what extent does the Sustainable Development policy (existing or planned) focus on Economic / Environmental / Social Factors?

The respondents were asked to consider to what extent the SD policies reflected the three prominent issues of sustainable development, namely environment, economic and social aspects. The respondents were asked to indicate the balance of the policy by marking the proportion of segments relevant to each aspect of sustainability within their policy documents (Figure 6.8). This was designed to evaluate the

emphasis that is put on each aspect of the 'triple bottom line' of sustainability and establish if those already with more mature SD policies hold the same view as those that have new or planned SD policies.

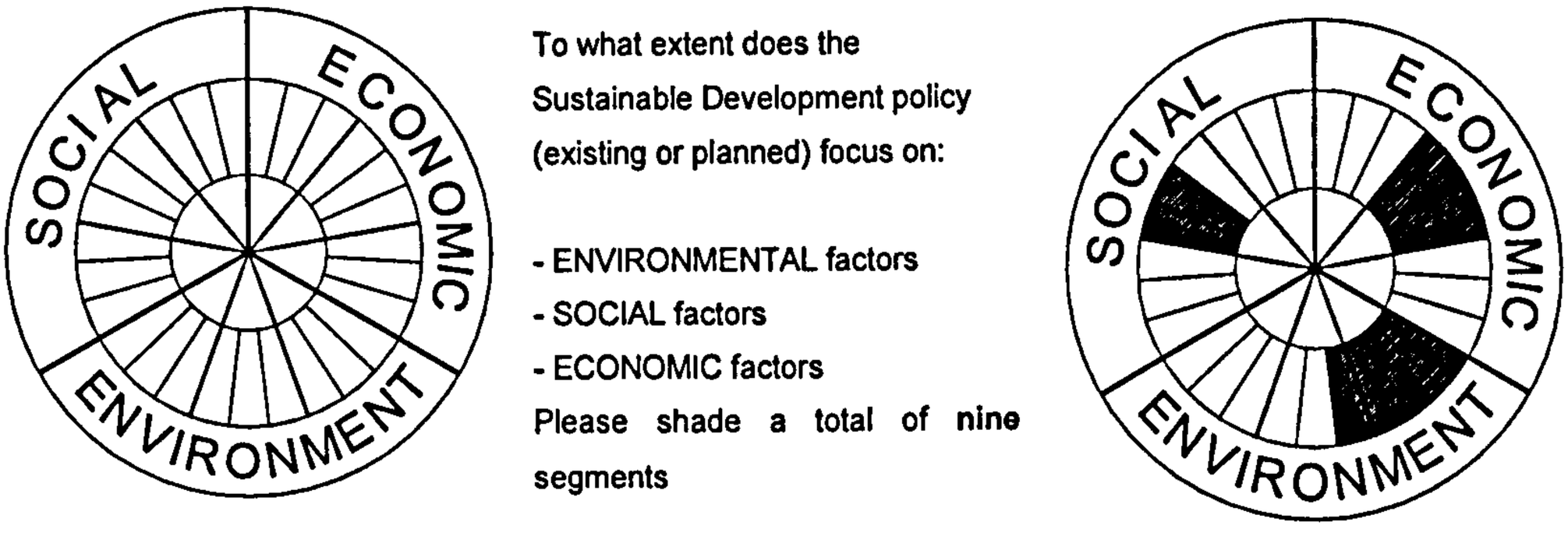


Figure 6-8: Balance of Sustainable Development policy diagram (from questionnaire)

The results indicate a predominance of SD policies with equal significance being associated with economic, social and environmental aspects of sustainability. The existing and projected SD policies were primarily an equal balance between social, economic and environmental features.

37% of respondents allocated three segments to each category giving equal emphasis for their sustainable development policy. Between 48% and 51% of respondents allocated three segments to social, economic or environment. The responses to this question have been presented in three graphs showing a normal distribution plot. Each response has an exaggerated frequency at 3 which reflect the dominance of this balanced response and results in the non-normal distribution of the data. The histogram for *Environment* is skewed to the right and represents a tendency for respondents to score environment more highly in their SD policies. *Social* and *Economic* are skewed to the left. This reflects a tendency to score less prominently in the SD policies.

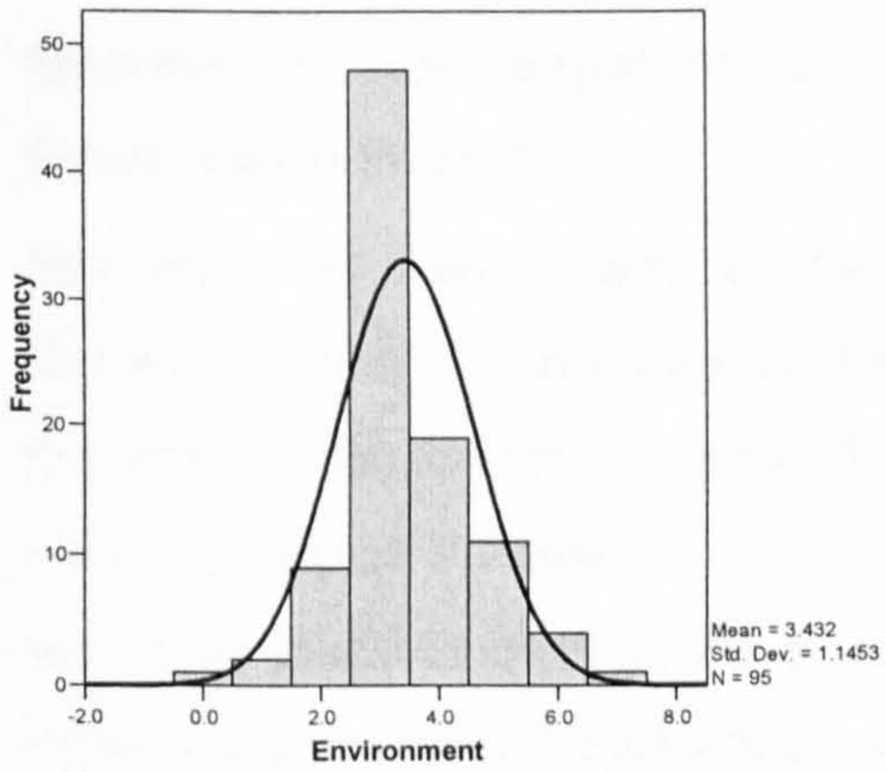


Figure 6-9: SD balance – Environment scoring

The mean score for *environment* is higher than *social* or *economic*. This indicates a greater number of respondents placing a greater emphasis on *environment*. The std.dev. of 1.1453 is the highest score of the three aspects of sustainability. This indicates the widest spread of responses.

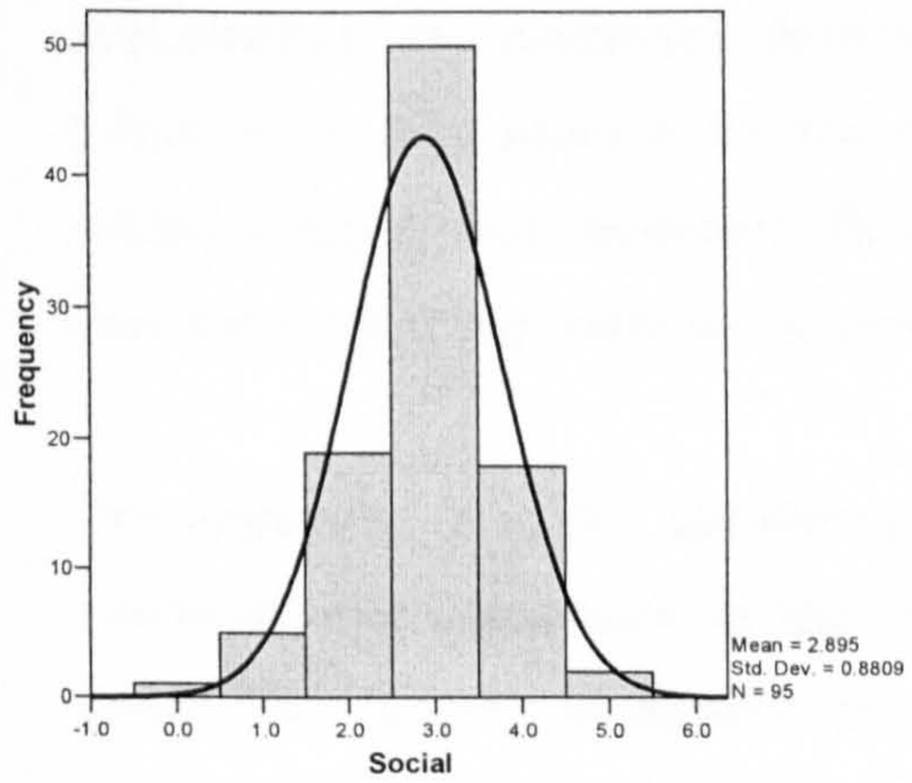


Figure 6-10: SD balance - Social

The mean of *social* is closest in value to a score of 3 (2.895). This indicates the largest percentage of respondents scoring 3 for this aspect. The std.dev. is the lowest of the three aspects indicating the narrowest range of responses.

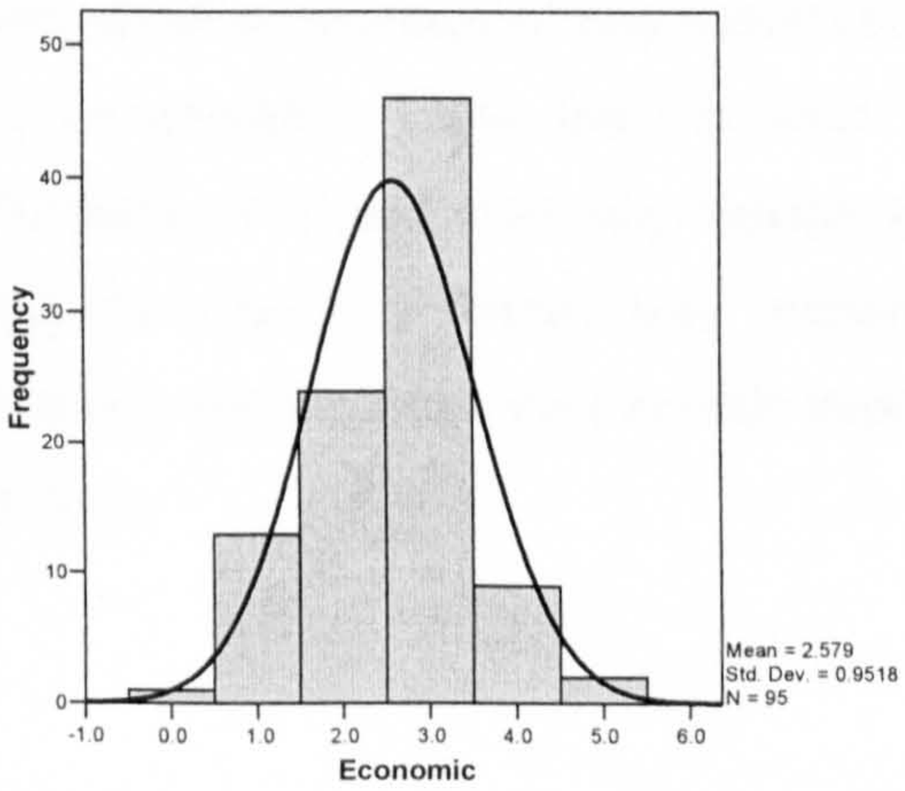


Figure 6-11: SD balance - Economic

The mean of 2.579 is the lowest of the three. There is a higher number of responses lower than 3. The std.dev. of 0.9518 indicates a spread of response higher than *environment* but less than *social.*

Question 6: How important are the following areas to your Sustainable Development Policy?

The grounded theory study conducted as phase one of the research produced fourteen features of sustainability that were important to the procurement of social housing and the delivery of sustainability. In the grounded theory study the features were considered in terms of their relevance but not in terms of the priority that would be given to them in the procurement of a housing project. This aspect of enquiry was the basis for adopting a quantitative methodology to establish the issues that were essential to the delivery of sustainable development. The respondents to the questionnaire were asked to consider each feature of sustainability and its importance to the sustainable development policy of their organisation. A five-fold Likert scale was adopted for the responses from essential to unimportant. The neutral category was *important.* This was selected because each of the features had been considered important due to their emergence out of the grounded theory study.

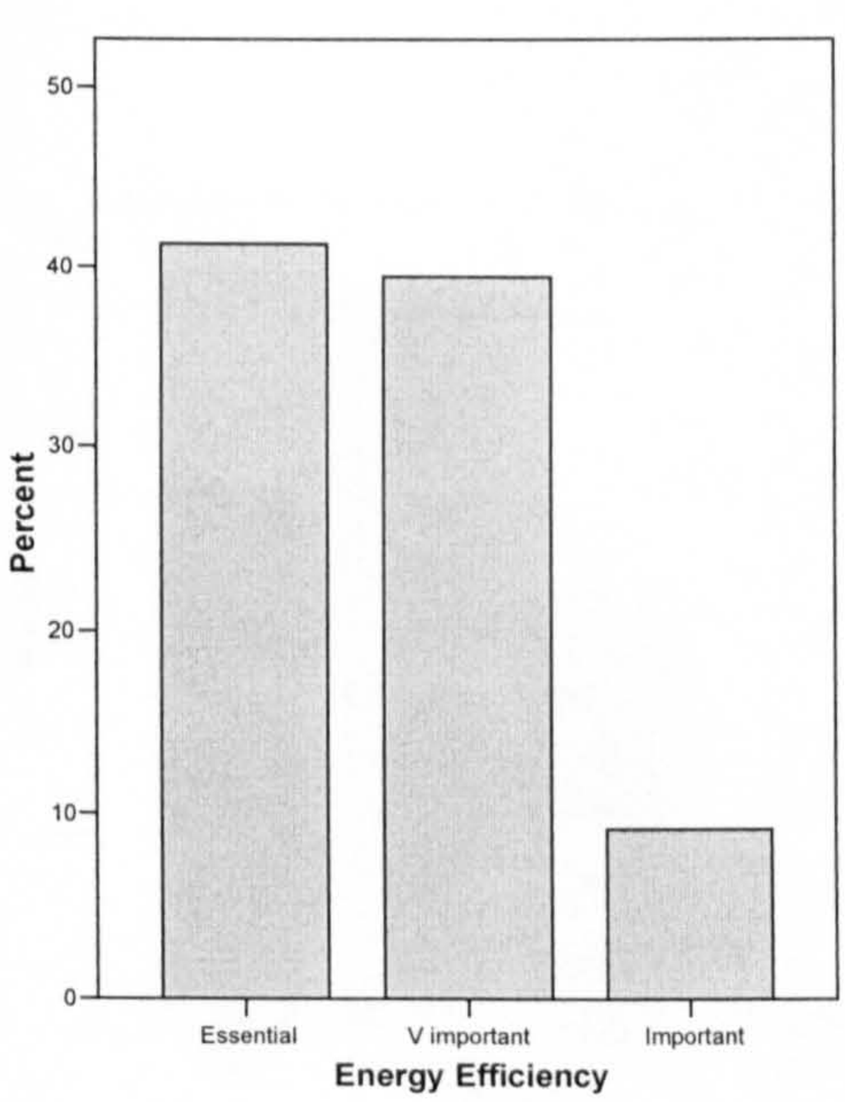
The responses from the questionnaire are presented in table 6.7. The responses confirmed the importance of the features of sustainability to the social housing sector. The majority of respondents considered all of the features to be *important, very important* or *essential.* Ten of the fourteen features had at least ninety one percent of respondents in agreement on this importance. Of these ten features only a very small percentages of respondents believed some of them to be either *secondary* or *unimportant.* These features were Building standards (2%); Funding (9%); Feedback (1%) and Involving Tenants (4%). Of these only one percent responded that the respective feature was unimportant. This validates the relevance of the features and confirms their overall importance to sustainability in the procurement process.

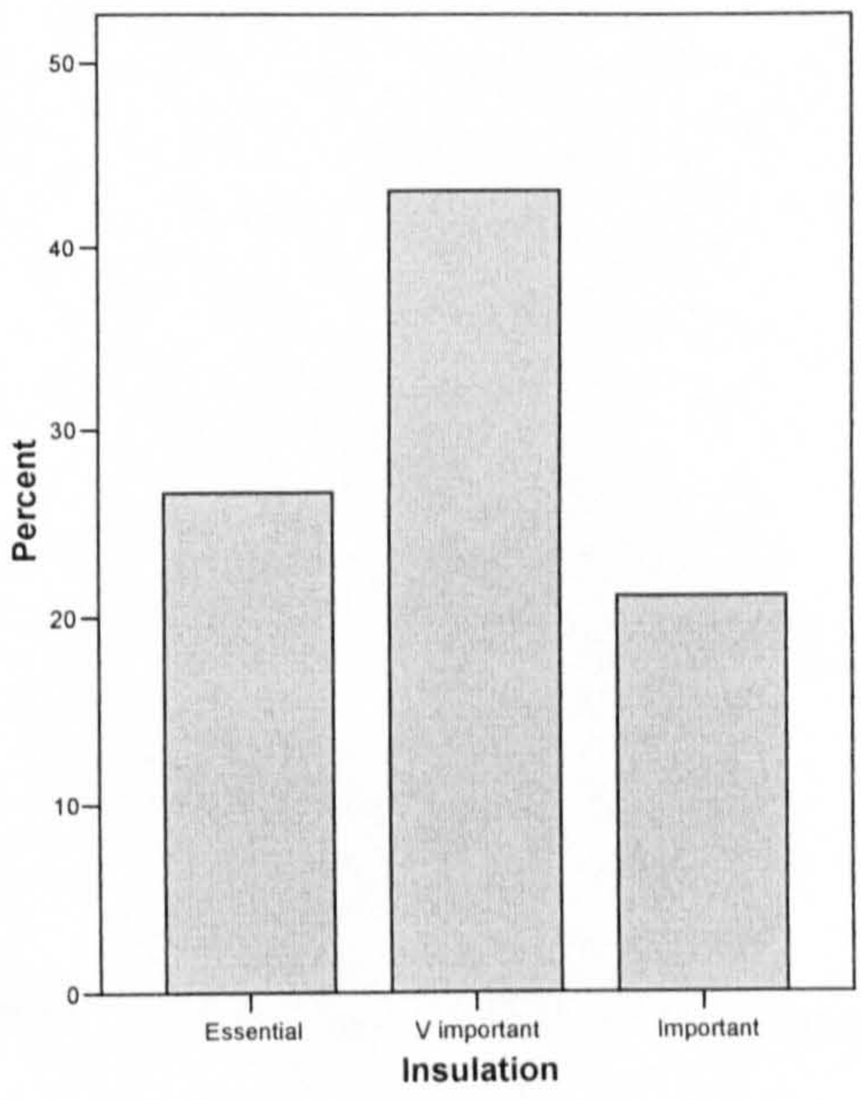
Table 6-7: Responses to question 6 (Features of SD important to SD policy)

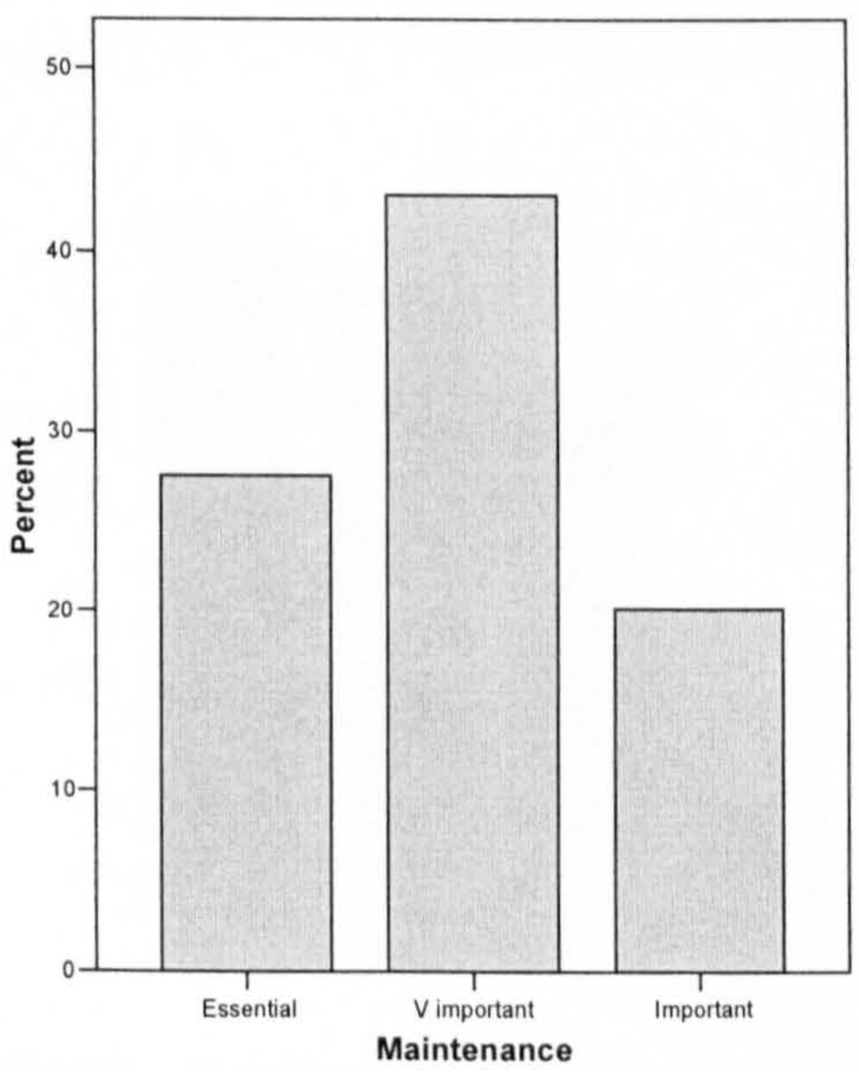
Category / Feature	Unimportant (1)	Secondary (2)	Important (3)	V.Important (4)	Essential (5)
1. Building Standards	1	1	13	40	44
2. Community Facilities	2	14	39	29	13
3. Energy Efficiency			10	43	45
4. Feedback		1	24	41	30
5. Fuel Poverty		1	31	46	20
6. Funding	1	8	22	35	32
7. Insulation			23	47	29
8. Involving Tenants		4	27	32	36
9. Maintenance			22	47	30
10. Mixed Development	6	14	31	33	13
11. Mixed Tenure	7	16	24	34	16
12. Quality of Specification			15	43	41
13. Recycling		13	51	24	9
14. Rent Levels	1	3	35	36	24
15. Other			3	1	2

Less importance was placed on the remaining four features. Mixed tenure (Feature 11); Mixed development (Feature 10); Community facilities (Feature 2) and Recycling (Feature 13) all had a higher proportion of their response in the neutral position on the Likert scale. This is indicated by the rating of *important*. Each of these features although considered important, was not as essential to the SD policies operated by the RSLs.

The fourteen features of sustainability were developed into seven paradigm models. The grouping of some of the sustainability features was an integral part of the model development. Analysis of the relationship between the features is reported in 6.7.3.







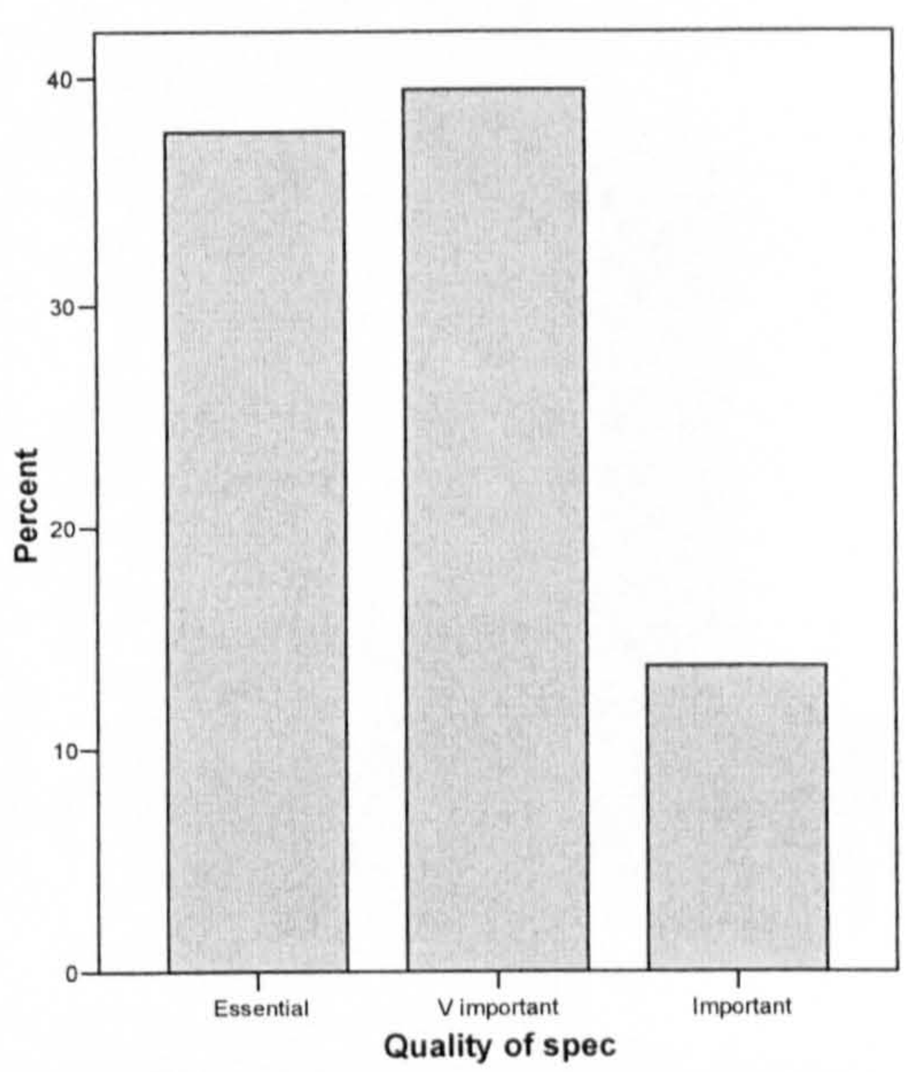


Figure 6-12: Features of sustainability scoring important /v important /essential

Four features were considered *important, very important or essential* by all respondents. Energy Efficiency; and Quality of Specification had the highest proportion were considered most essential. Insulation; and Maintenance attracted less strong response, with the majority of respondents considering them *very important.*

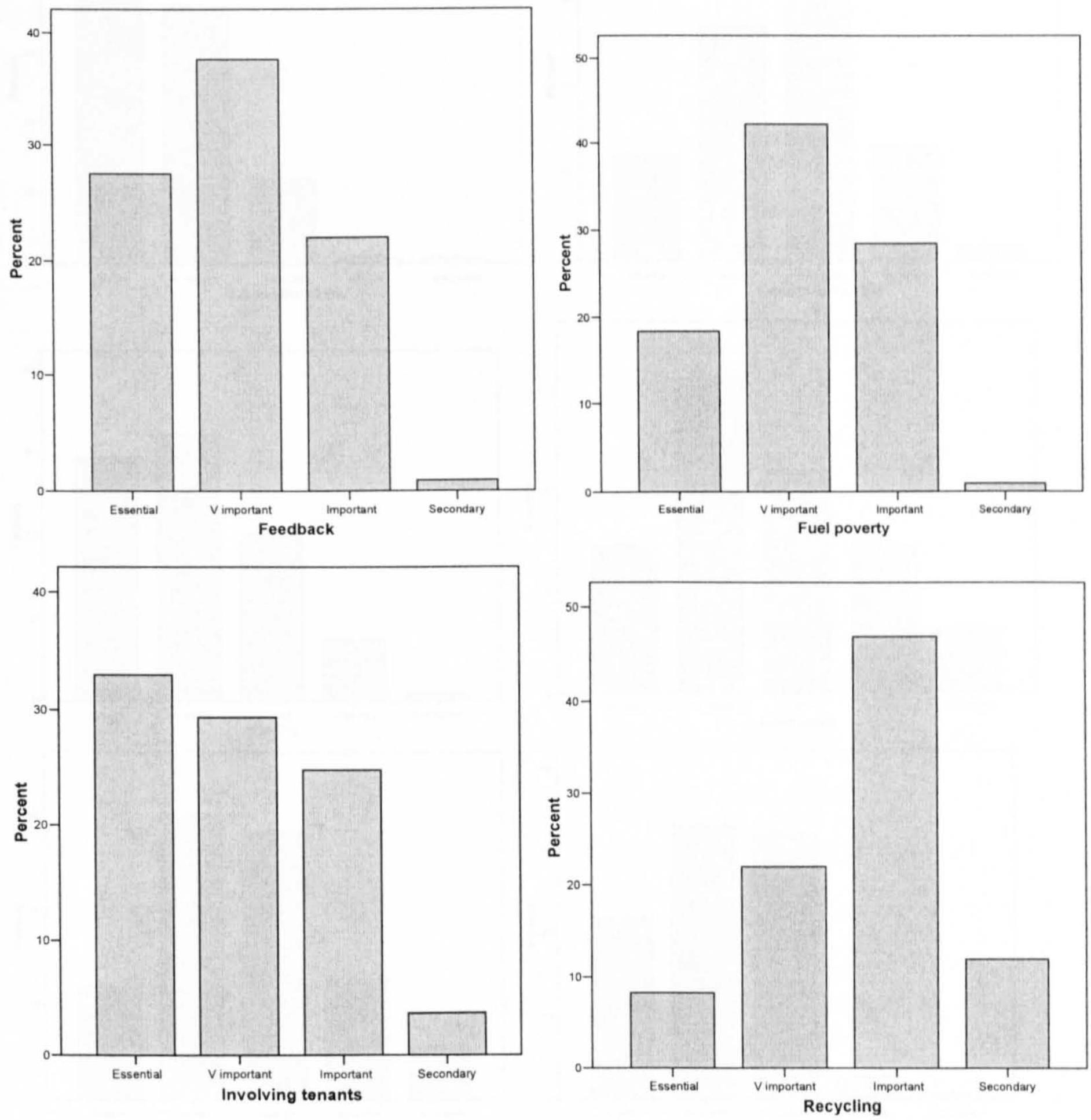
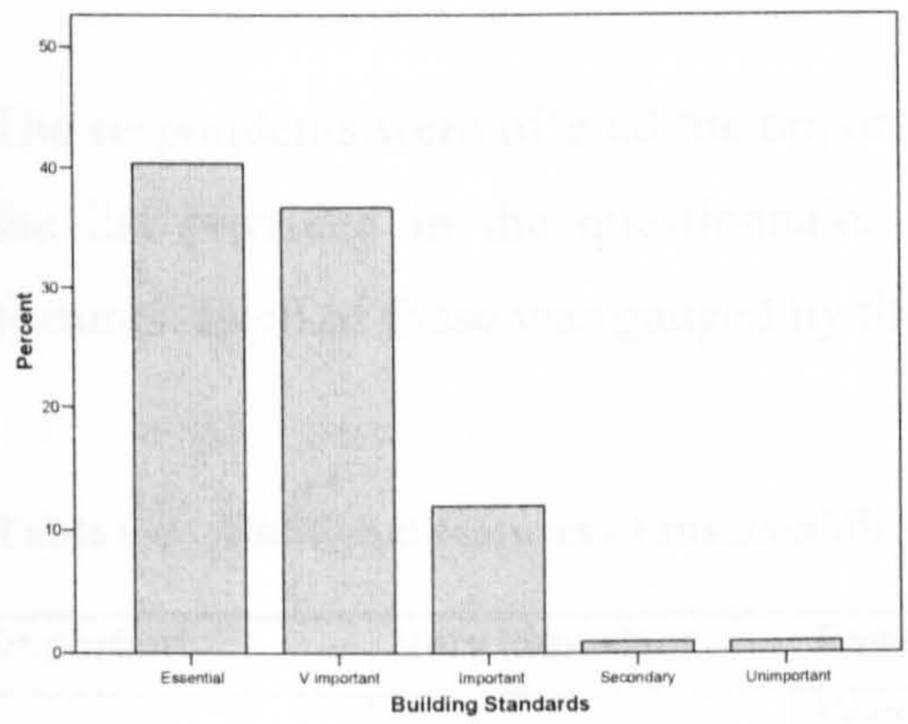
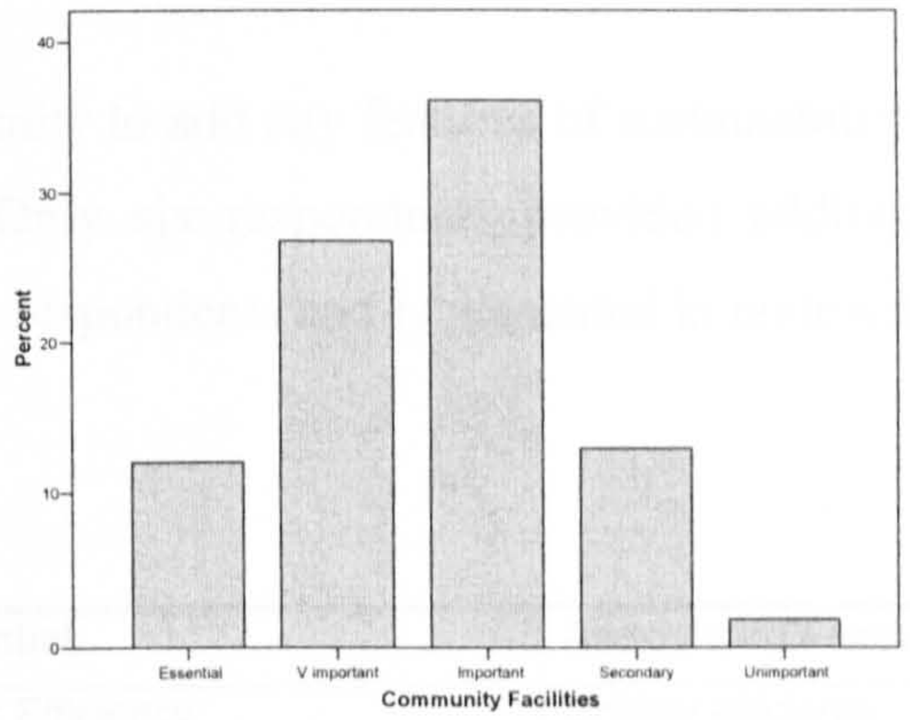
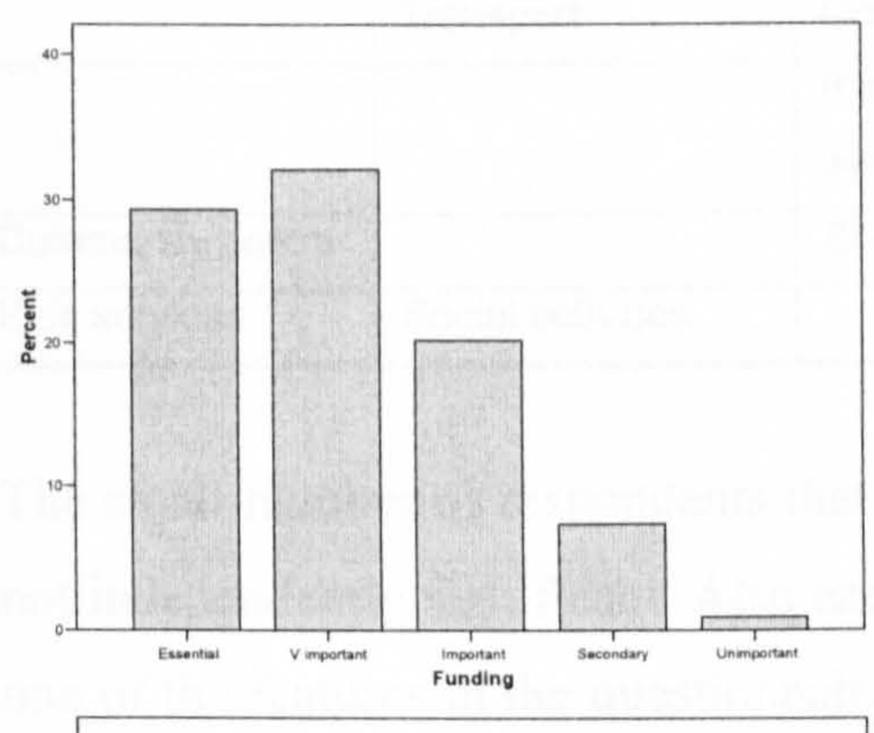


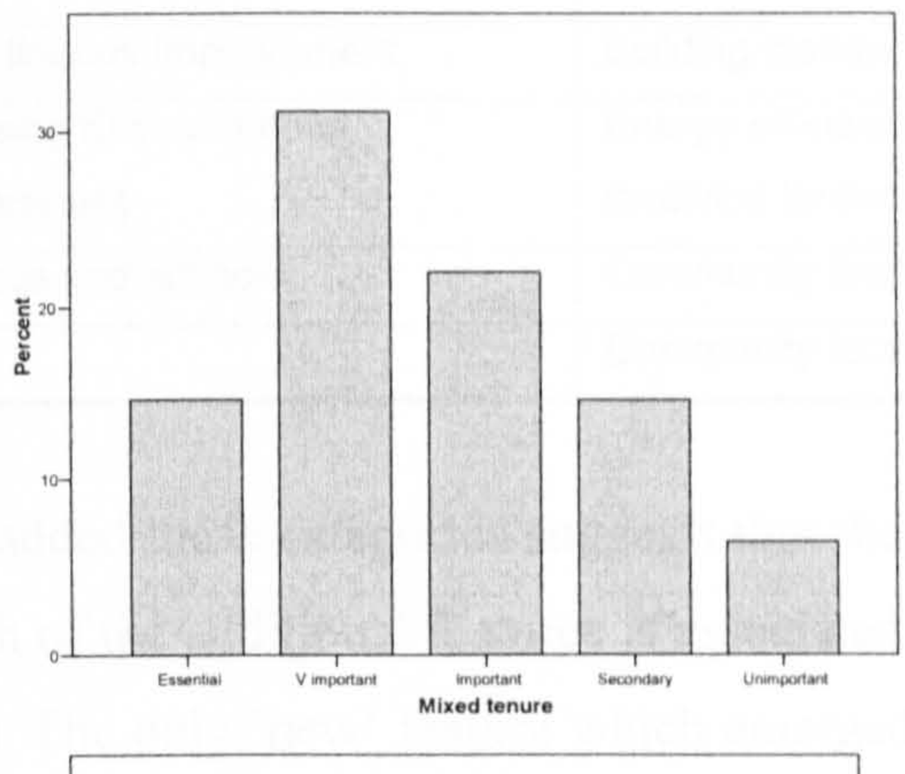
Figure 6-13: Features of sustainability scoring secondary /important /v important /essential

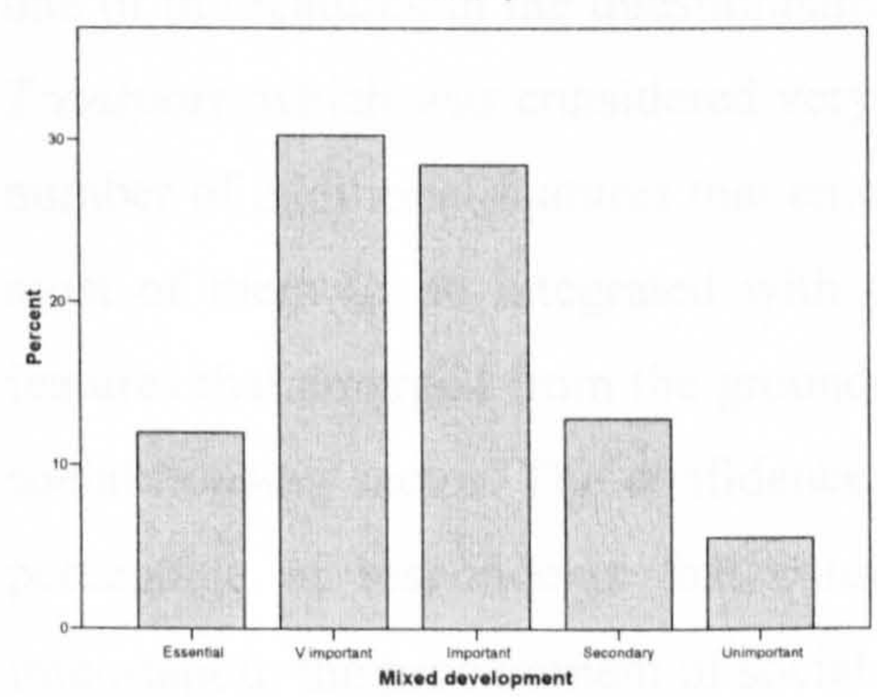
The four features of Feedback; Fuel Poverty; Involving tenants; and Recycling all attracted a small number of respondents believing them to be secondary. Feedback and Involving Tenants were generally considered more important than Fuel Poverty and Recycling.











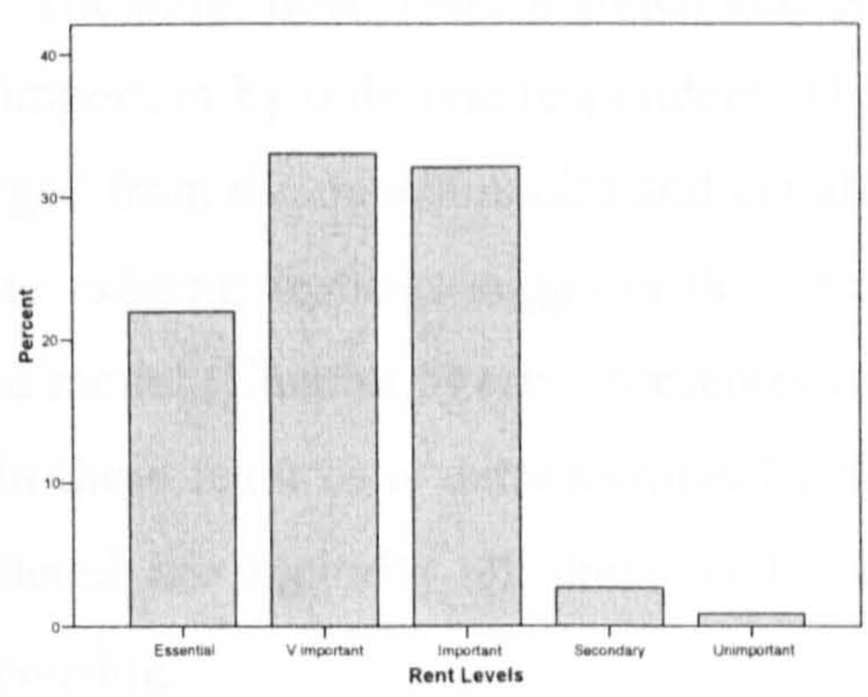


Figure 6-14: Features of sustainability scoring in all categories

Six features attracted a mixed response from respondents. This demonstrates less certainty in the importance of these features for sustainability across the social housing sector. Mixed development; Mixed tenure; and Community facilities attracted the highest percentage of responses indicating that they were unimportant to sustainability. These features constitute the Community Development paradigm model.

The respondents were offered the opportunity to add any features of sustainability to the list provided in the questionnaire. Only six respondents provided additional features. Each of these was gauged by the respondents and is presented in table 6.8.

Table 6-8: Additional features of sustainability

Important	Very Important	Essential	Associated Feature
		Water Efficiency	Energy efficiency
	Transport	Continuous Improvement	Building standards
		Raising Environmental awareness	Energy efficiency / Involving tenants
Community centre		Shops and schools	Community facilities
Kids services	Social activities		Community facilities

The small number of respondents that added these categories suggests that they are not independently significant. Also each of the additional features is associated with one of the features in the questionnaire. The only 'new' feature which emerged was *Transport,* which was considered very important by only one respondent. The small number of additional features that emerged from the questionnaire and the ability of most of them to be integrated with the existing features suggests that the set of features that emerged from the grounded model (Chapter 5) are representative of the social housing sector. The confidence in these features is demonstrated by the high percentage of respondents that considered the majority of them to be at least important to the procurement of social housing.

To determine the relative importance of each of the features a simple weighting was attached to each category to determine the features that were considered most important. Each of the categories in the Likert scale was weighted and allocated a score from one to five. A cumulative score for each feature was calculated to derive a score to prioritise the features. This technique involved applying an ordinal scale to the categories established on the Likert scale. Each response rate is multiplied by the

weighting score to establish a score for each category. All the category scores are added together to provide a total score for each feature. This allowed the manipulation of the data to establish the most dominant features. These are presented in Table 6.6.

Table 6-9: Weighted scoring of each feature

	Unimportant (1)	Secondary (2)	Important (3)	V.Important (4)	Essential (5)	Total Score
Energy Efficiency			10	43	45	**397**
Building Standards	1	1	13	40	44	**383**
Quality of Specification			15	43	41	**377**
Maintenance			22	47	30	**338**
Insulation			23	47	29	**333**
Funding	1	8	22	35	32	**317**
Feedback		1	24	41	30	**316**
Involving Tenants		4	27	32	36	**316**
Fuel Poverty		1	31	46	20	**286**
Rent Levels	1	3	35	36	24	**271**
Mixed Tenure	7	16	24	34	16	**255**
Mixed Development	6	14	31	33	13	**231**
Community Facilities	2	14	39	29	13	**211**
Recycling		13	51	24	9	**167**
Other			3	1	2	-

The weighting of the responses allows a comparison to be made between the features. The features have been rearranged in priority from highest down to lowest in table 6.6. This exercise reveals that Energy efficiency (Feature 3) is the feature with the highest relevance to the sustainable development of social housing. Building Standards (Feature 1) is the second most important feature. The lowest

scoring feature is recycling (Feature 14). This feature of sustainability did not emerge in the conversation with the housing associations. It was evident in the conversation held with the consultants. This confirms that the relevance of this feature, although seemingly important to the procurement process is not considered vital by the RSL sector.

Overview of Sustainable Development Policies

It was surprising to find more than half of the responding RSLs did not have a sustainable development policy. Although most of these organisations intended to develop one, one might assume that this is only because of a regulatory requirement to gain funding. Sustainable development policies were generally regarded as having an equal balance of social, economic and environmental features and this might be expected as a reflection of the national and international policies in common usage that strike this balance very clearly. The analysis of the features of sustainability did reveal a different emphasis on features that might have been grouped into social, economic and environmental groupings. This aspect is analysed in more detail in 6.7.2.

6.6.3 Results Part 3 : Partnering and Sustainable Development

The third part of the questionnaire was designed to capture data on partnering and its ability to deliver sustainability. The first question gathers data on the parties that RSLs partner with. The second question presents features of partnering derived from the literature and asks the respondent to consider the benefit it can deliver. The final questions in the questionnaire ask the respondent to consider the ability of procurement approaches to deliver sustainability. Traditional and Design and build are the most common forms of contracting found in the social housing sector. Partnering is now being advocated by the housing agencies in Scotland and England. The belief being that partnering is able to deliver improvement through the procurement system. This part of the questionnaire was aimed at exploring these

three procurement approaches and discovering if the RSL sector were generally in agreement with the housing agencies on the implementation of partnering.

Question 7: Do you undertake partnering for development work with Consultants / Contractors / Sub-contractors / Suppliers / Other housing associations?

It was found that a higher proportion of RSLs were engaged in partnering than not. The most common form of partnering was 'Project' partnering with consultants and contractors. Almost forty percent of RSLs were in partnerships with other RSLs (housing associations). The least common partnering was with sub-contractors or suppliers.

Table 6-10: Partnering activity with other stakeholders

	Split into small med large	Strat Part - N	Project Part N
Consultants	Small HAs	2	6
	Medium HAs	19	20
	Large HAs	22	36
	Total	43	62
Contractors	Small HAs	2	4
	Medium HAs	13	24
	Large HAs	24	42
	Total	39	70
Subcontractors	Small HAs	2	2
	Medium HAs	9	12
	Large HAs	11	13
	Total	22	27
Suppliers	Small HAs	2	2
	Medium HAs	9	11
	Large HAs	15	19
	Total	26	32
Other RSLs	Small HAs	4	6
	Medium HAs	15	20
	Large HAs	24	21
	Total	43	47

Strategic partnering was less common than project partnering. The only incidence of strategic partnering exceeding project partnering was the Large RSLs partnering with other RSLs. This might be explained by the trend towards mergers of RSLs and the introduction of a funding regime supporting partnering.

Question 8: Which of the following areas are benefited by partnering as opposed to traditional contracting and by how much?

Question eight was designed to elicit response on the scale of benefit that might be gained from partnering. The categories were designed on a four-point Likert scale from no benefit to most benefit. The respondents were presented with ten features that are thought to be associated with the use of partnering. These features emerged from the literature review. The literature is very positive on the benefits that can be achieved in these areas. By questioning the RSLs it is possible to establish the extent to which these benefits are achievable through the use of partnering.

Table 6-11: Benefits of partnering perceived by RSLs

Category / Feature	No Benefit (1)	Minor Benefit (2)	Medium Benefit (3)	Major Benefit (4)
Financial saving	20	26	38	16
Housing quality	6	13	44	38
Working relationships	0	8	22	71
Community gains	15	30	35	19
Design processes	2	15	38	44
Construction processes	3	8	52	36
Reduced conflict	3	9	40	47
Improved trust	2	10	37	51
Time savings	18	25	34	22
Culture change	9	21	41	28

The feature of *Working relationships* was perceived as offering major benefit of partnering to the procurement system by 70% of respondents. 20% of respondents

believed that no benefit was gained for the feature *financial saving*.. This feature along with *time saving* (18%) and *community gains* (15%) were the three features of partnering that gave least confidence in their ability to benefit the procurement system.

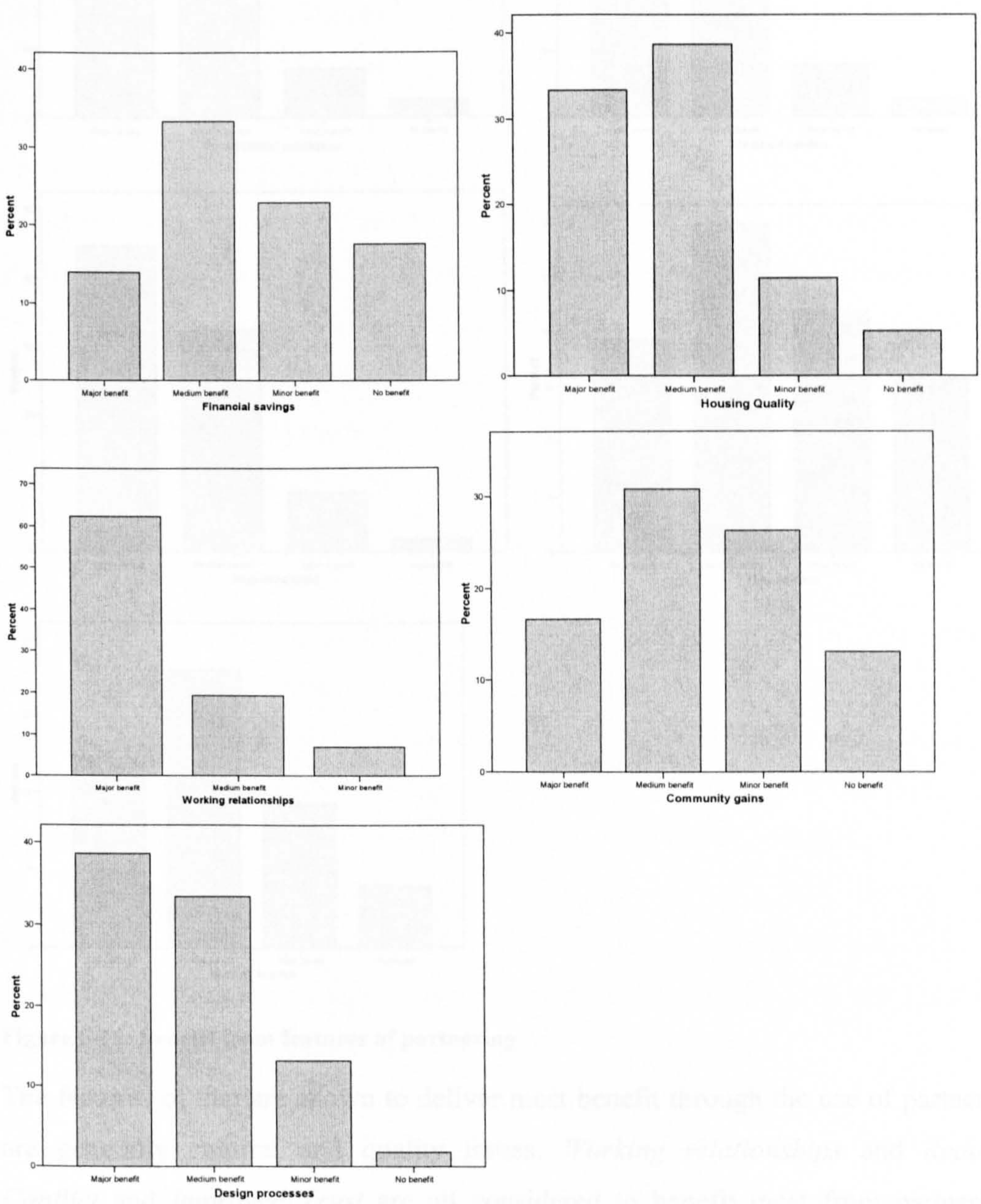


Figure 6-15: Benefit from features of partnering

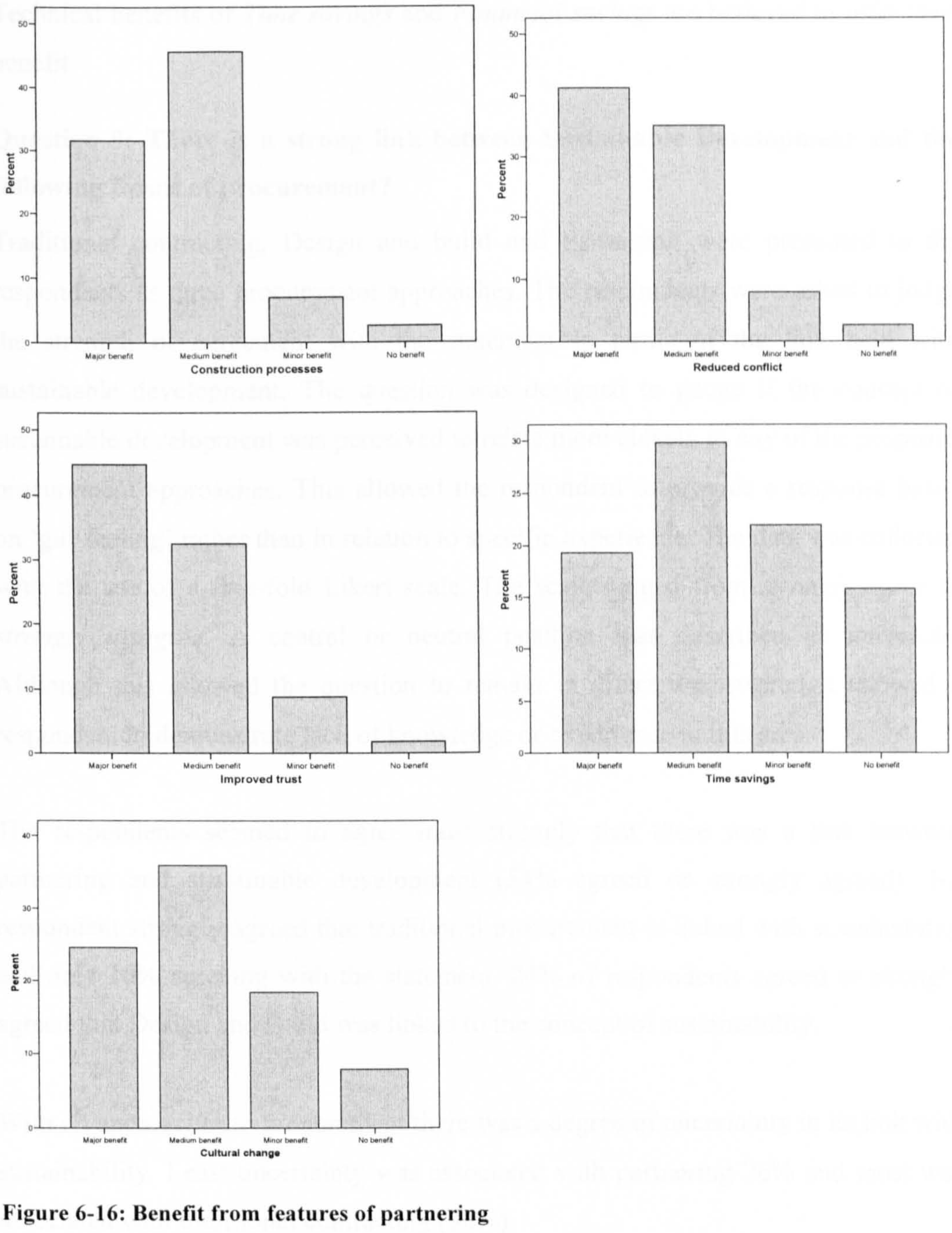


Figure 6-16: Benefit from features of partnering

The features of that are shown to deliver most benefit through the use of partnering are generally cultural and quality issues. *Working relationships* and *Reduced Conflict* and *Improved Trust* are all considered to benefit most from partnering.

Technical benefits of *Time savings* and *Financial savings* are believed to offer least benefit

Question 9: There is a strong link between Sustainable Development and the following forms of procurement?

Traditional contracting, Design and build and Partnering were presented to the respondents as three procurement approaches. The respondents were asked to judge the strength of agreement with the statement in terms of the link held with sustainable development. The question was designed to gauge if the concept of sustainable development was perceived to relate more closely to any of the proposed procurement approaches. This allowed the respondent to provide a response based on 'gut-feeling' rather than in relation to specific experience. The data was collected with the use of a five-fold Likert scale. The scale ranged from *strongly agree* to *strongly disagree*. A central or neutral position was described as *uncertain*. Although this allowed the question to remain in effect unanswered it allowed a respondent to demonstrate lack of knowledge or experience in this area.

The respondents seemed to agree most strongly that there was a link between partnering and sustainable development (54% agreed or strongly agreed). No respondent strongly agreed that traditional procurement is linked with sustainability and only 16% agreeing with the statement. 24% of respondents agreed or strongly agreed that Design and Build was linked to the concept of sustainability.

With all approaches to procurement there was a degree of uncertainty in its link with sustainability. Least uncertainty was associated with partnering 26% and most was associated with traditional contracting (38%).

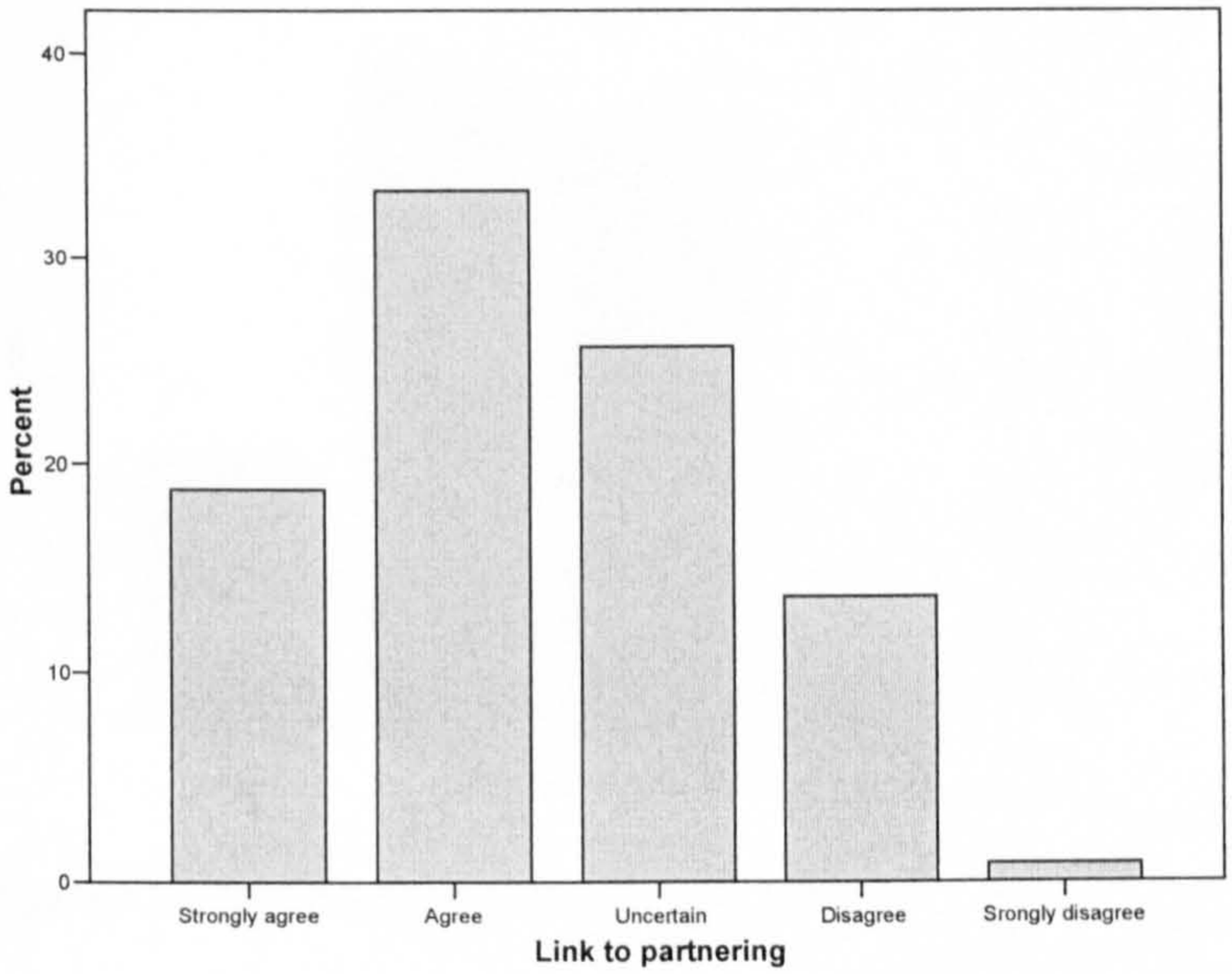


Figure 6-17: Perceived link between partnering and sustainability

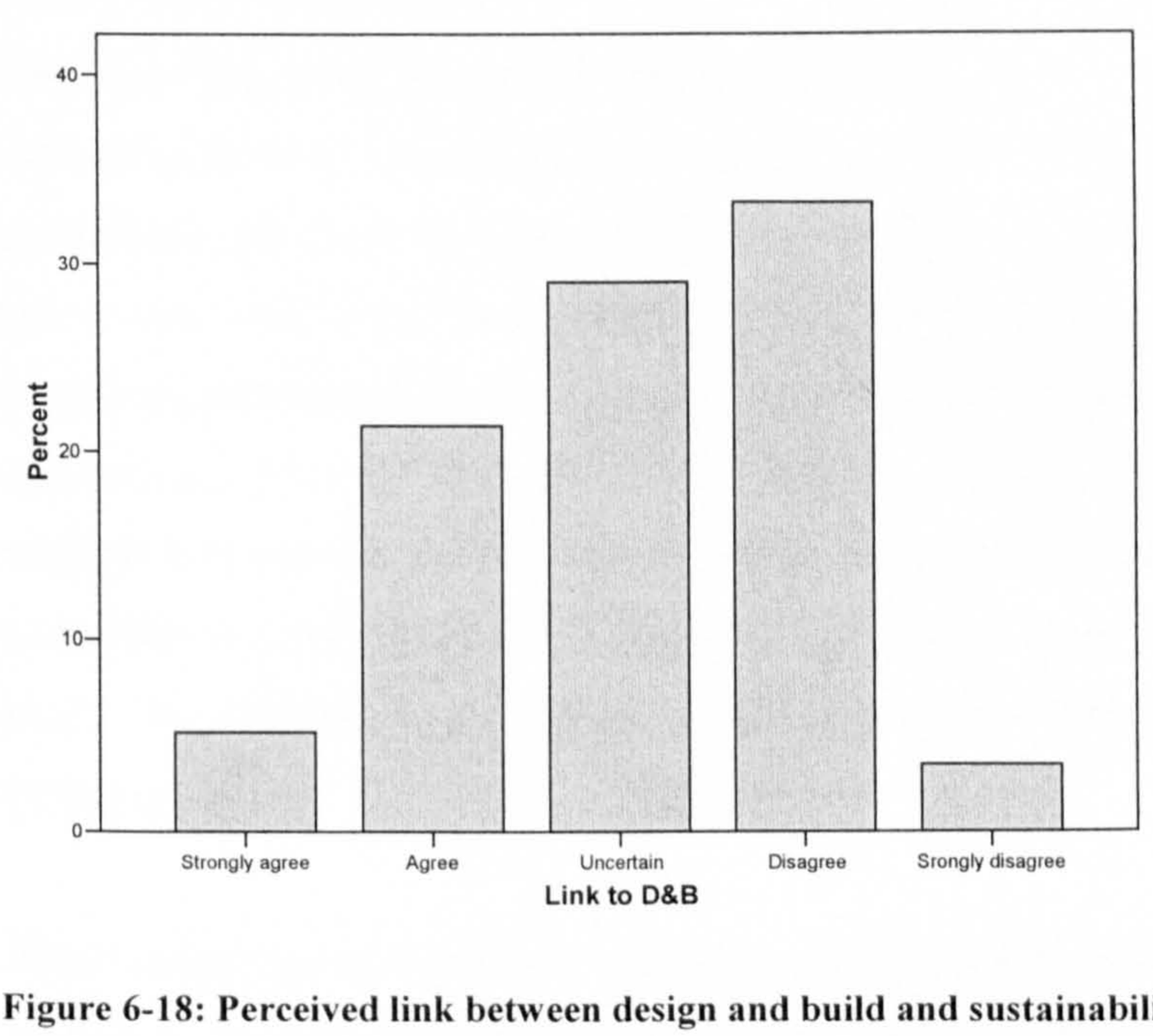


Figure 6-18: Perceived link between design and build and sustainability

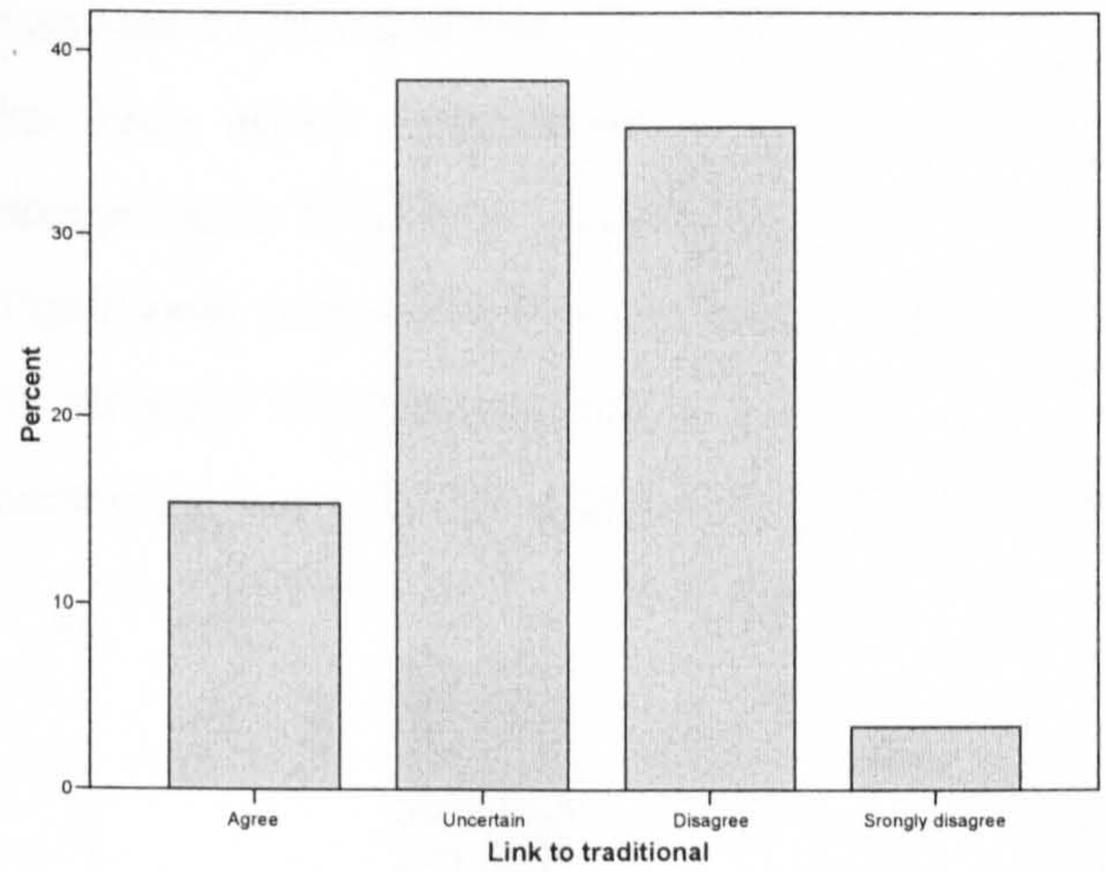


Figure 6-19: Perceived link between traditional contracting and sustainability

Question 10: The following forms of procurement are able to deliver Sustainable Development:

This question while similar to the previous question was designed to develop the rational of the link between sustainability and procurement. Once the respondent had considered the link between procurement approach and sustainability in general terms, they were asked to consider how well the procurement approaches were able to deliver sustainability. This question draws on the experience and perceptions the respondents have in relation to procurement activity. Although the question is subjective it reveals the confidence held in each procurement approach with regard to delivering sustainability. The same five-fold Likert scale was used as for question nine. The responses are similar to the previous question but there are subtle differences found in the detail of the response.

When asked to consider the ability to deliver sustainability there was stronger agreement that all types of procurement are able to deliver sustainability. Partnering was considered to be able to deliver sustainability by 76% of respondents. Design and Build and Traditional procurement were considered able to deliver sustainability by 57% and 50% of respondents respectively. Less uncertainty was apparent in the

response to this question. This may be explained by the more specific question that has been asked. Uncertainty on the ability of Design and Build and Traditional procurement to deliver sustainability was expressed by a quarter of respondents. Traditional procurement also had the highest percentage of respondents disagreeing or strongly disagreeing that it was able to deliver sustainability (14%), whereas partnering has only 3% disagreeing that it could deliver sustainability.

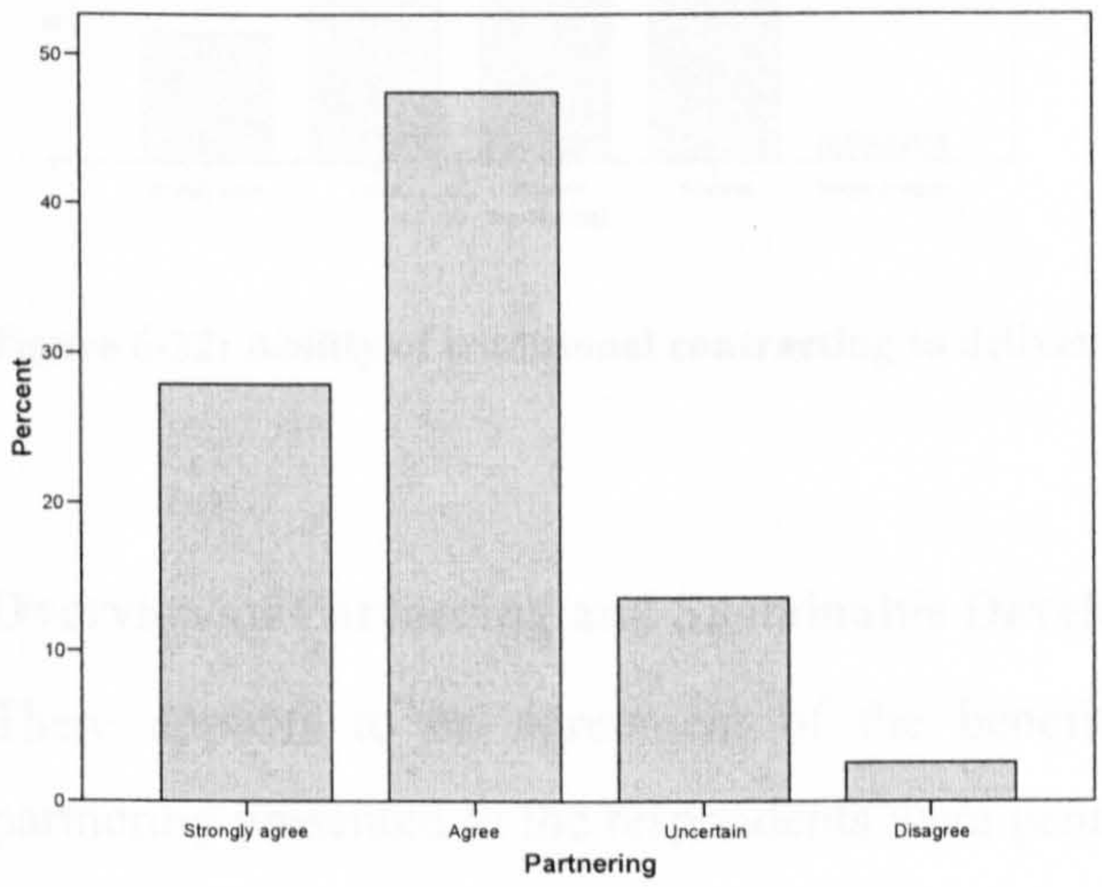


Figure 6-20: Ability of partnering to deliver sustainability

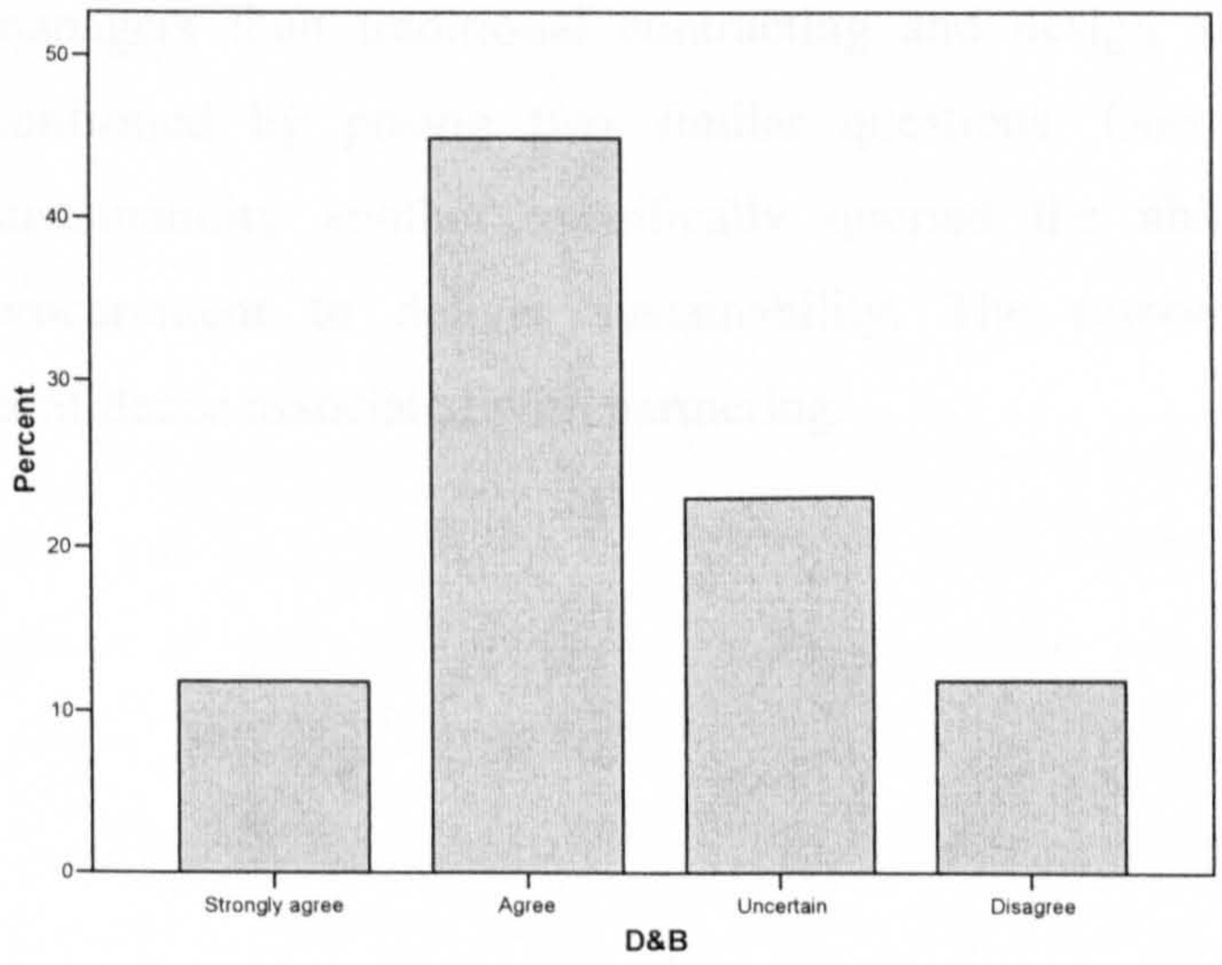


Figure 6-21: Ability of design and build to deliver sustainability

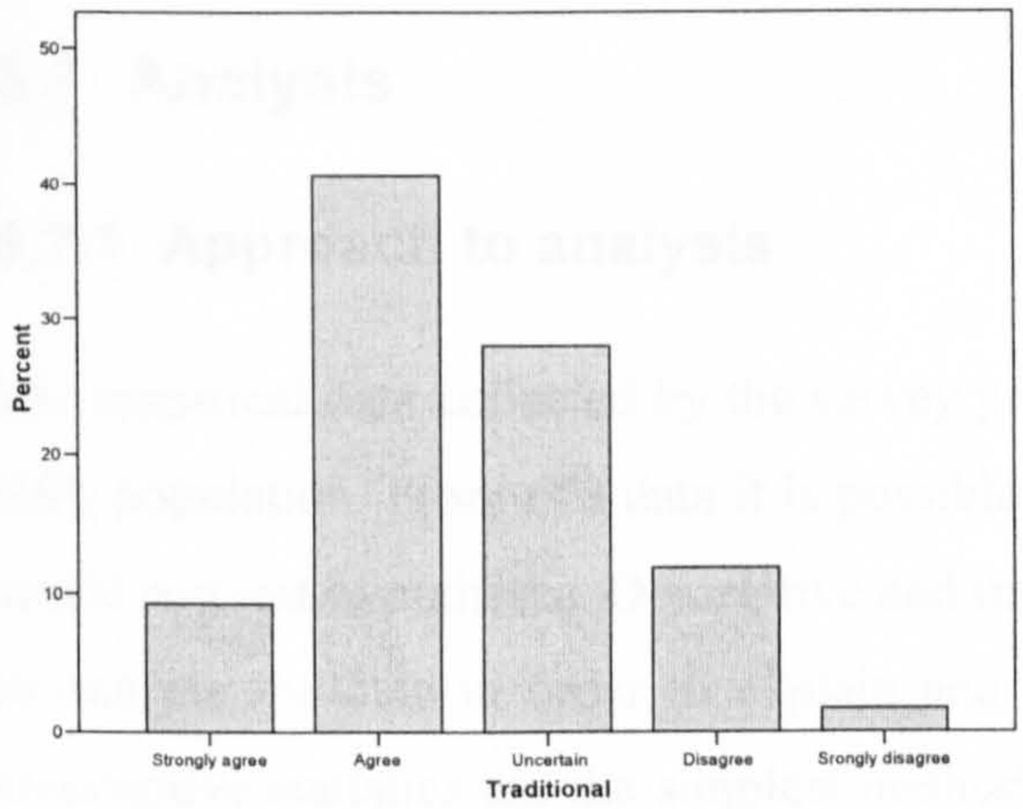


Figure 6-22: Ability of traditional contracting to deliver sustainability

Overview of Partnering and Sustainable Development

There appears to be agreement of the benefits of partnering. The features of partnering presented to the respondents were generally thought to offer benefit to the procurement system. The perception of partnering in relation to delivery of sustainability appears to be providing greater confidence to the RSL development managers than traditional contracting and design and build. This position was confirmed by posing two similar questions. One explored a general link to sustainability another specifically queried the ability of three approaches to procurement to deliver sustainability. The responses appear to confirm the confidence associated with partnering.

6.7 Analysis

6.7.1 Approach to analysis

The empirical data collected by the survey provides information on the views of the RSL population. From this data it is possible to build pictures or models of the real world and test hypotheses. Descriptive and inferential statistical tests have been used to analyse the data in order to explain and test relationships that appear to exist. Descriptive statistics are the simplest method of analysis. Most of the results in the previous section have been interpreted using the descriptive statistics method (Naoum 1998). This involves the use of techniques like frequency distribution and calculation of the mean and standard deviation. These techniques model the data into a format that is more easily interpreted. This section focuses on further analysis using both descriptive and inferential statistical tests.

Generation of Hypotheses

This phase of research was originally intended to test the features of sustainability that emerged from the grounded theory study. The survey was used to collect information on these features and information specific to sustainable development policy and partnering practice. In designing the survey certain hypotheses were suggested and others became apparent after the data had been collated.

The first stage of any data analysis is to explore the data (Field 2000). Once the raw data had been imported into SPSS, a large number of graphs and tables were generated. Bar charts showing either percentage of frequency of categories for each variable identified trends in the data. This approach allowed the results to be explored systematically. Most of the variables were considered individually before combining pairs of variables to explore relationships in greater depth. The majority of this data was presented in graphical and tabular form in section 6.6. Exploration of the data revealed trends in the data that suggested relationships between some of

the variables. The survey was designed with around a number of hypotheses. The rest of the hypotheses emerged out of exploration of the data. The basic hypotheses of the survey were:

Primary hypotheses

1. Sustainable development policies are based on the triple bottom line – providing equal emphasis on environmental, economic and social aspects (Chapter 2 and 5)
2. Some of the features of sustainability are related – the strongest relationships are found between the features integrated in the paradigm models (Chapter 5)
3. The features of partnering from the literature deliver benefit through the procurement system (Chapter 2 and 4)
4. Partnering is a more appropriate procurement approach for delivery of sustainability (Chapter 2)

Following exploration of the survey data, several new hypotheses emerged.

Emergent hypotheses

5. The large RSLs are increasing their share of the development sector
6. The maturity of sustainable development policy has an influence over the features of sustainability that are essential to a social housing project.
7. The experience an RSL has of partnering has an influence over their perception of its ability to deliver sustainability

It is not possible with statistics to prove that a hypothesis is right. It is only possible to establish if it should be rejected or not. To do this a *null* hypothesis is tested rather than the actual hypothesis. Each of the above hypothesis were allocated *null* hypothesis in order to conduct the relevant statistical test. The researcher must then decide if the hypothesis is to be rejected or not. If a hypothesis is rejected and it is in fact true a Type 1 error has occurred. A Type 2 error occurs when a hypothesis is

rejected and it is false. The likelihood of performing a Type 1 or Type 2 error is related to the probability or significance level. Using SPSS the probability of the result is calculated and expressed as P. In the social sciences a value for P of 0.05 or less is considered significant. This value represents the probability that the relationship occurred by chance. If the value of P is 0.05 then the probability of the value occurring by chance is five percent.

Parametric and Non-parametric data

All too commonly analysis is reported based on the use of an inappropriate statistical test (Calder 1996:226). It is vitally important that the most appropriate test is carried out to ensure the validity of the analysis and the conclusions that may be inferred. The test that can be used is determined by the characteristics of the data. Normality in data sets is an important concept. It has a bearing on the type of statistical test that may be used. Normality is defined by the distribution of the data. Normal distribution is characterised by a symmetrical, bell-shaped graph with the mean and median at the centre and can be calculated using the Kolmogorov-Smirnov test. This test was carried out on a range of variables to test if the data was normally distributed. The result of this test is illustrated in Figure 6.20 representing the categories of the population (*Number of Units Owned by RSL*) was tested for normality. As was suspected the population sample was non-normal.. The plots deviate from the straight line plot and are therefore considered not normal.

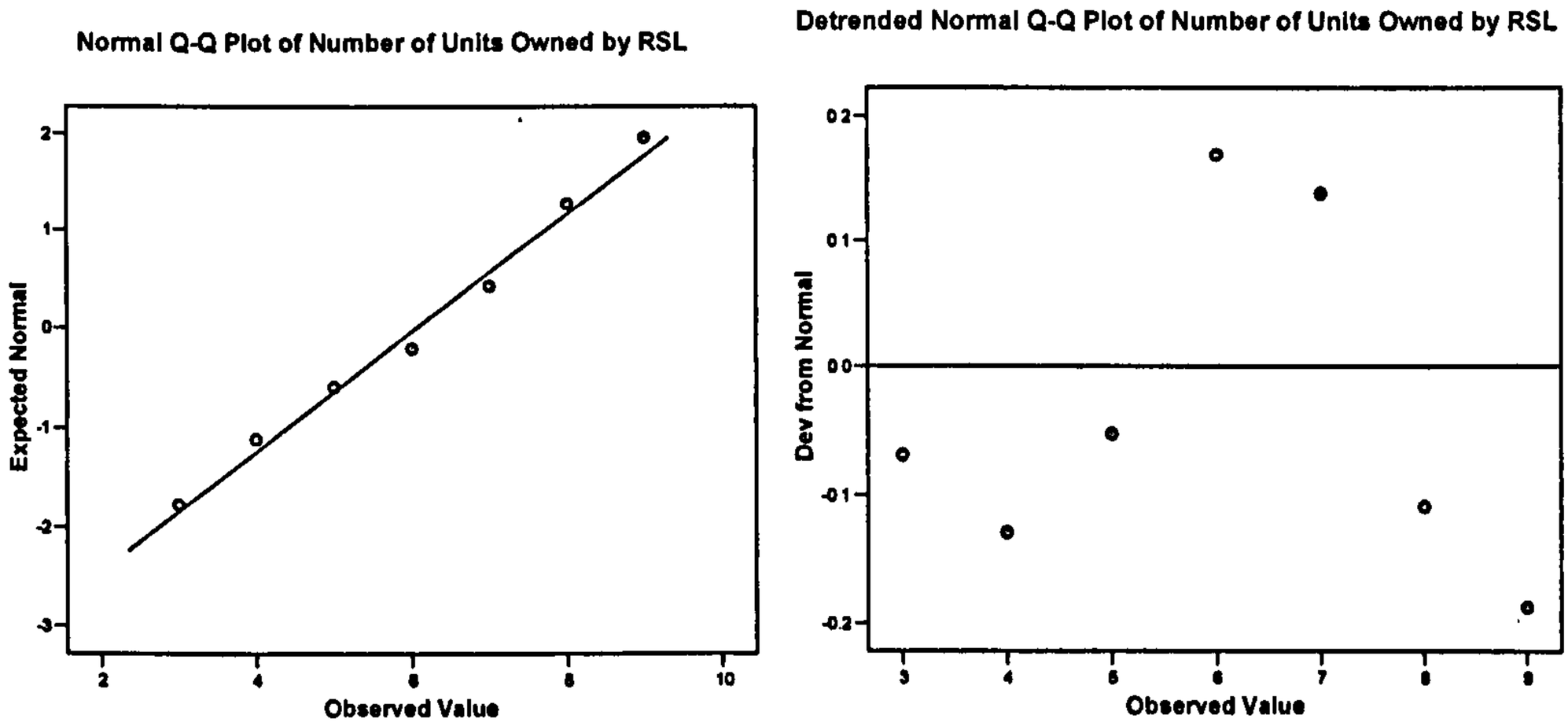


Figure 6-23: Normal Q-Q and Detrended Normal Q-Q plot for Number of Units Owned by RSL

The implication of non-normal data is that parametric tests are not suitable. As was discussed earlier in this chapter, many of the questions in the survey collected ordinal data (ranking data). The type of scale used for ordinal data implies a sequential order to the categories, but does not give any indication of the distance or measure between the categories. This means that the data gathered using ordinal scales do not meet the assumptions of parametric data. Because of this non-parametric tests are used to test relationships between categories. There are a range of non-parametric tests that may be applied to non-normal data. The advantage of these tests is that they can be used to measure the type of data that is based on subjective ranking. While it is true that parametric tests are more powerful (Field 2000) than non-parametric tests the use of non-parametric tests allows a more subjective data to be tested for strengths of relationships.

Statistical tests

Inferential statistics are used to draw conclusions about a wider population. They involve hypothesis testing and estimation of population parameters (Calder 1996). The use of a statistical test can show if a relationship is significant. This simply means that the relationship has not happened just by chance. A wide range of statistical tests exist. In any statistical test it is only possible to prove A range of

non-parametric tests are available including the Chi-square, Cramer's V and Kendall's tau. The Chi-square test is useful to measure if there is a significant association between two variables. The test compares the expected values with the observed values using the following equation:

$$X^2 = \sum(O-E)^2 / E$$

The Chi-square does not measure the strength of association. This requires a different test. The Cramer's V is used when the data is categorical and tests the strength of association between two variables. This test is used when variable have more than two categories. The third statistical test is useful for testing correlations between sets of variables. The output of a Kendall's tau test determines the strength and direction of a covariance. This exists when change in one variable is matched by similar change in another variable. These three statistical tests have been used to conduct inferential analysis on the data.

6.7.2 Respondent Characteristics

The responses to the survey presented data on the size of the RSL organisation. This was collected in order to establish if the sample represented the population being studied. A comparison of the population highlighted that there were differing proportions of each size of organisation that had responded. While each category was represented, a high percentage of large organisations and a small percentage of small organisations were included in the sample. The questionnaire was circulated using random sampling to provide an equal chance of each size of organisation being approached. The sample represented one third of developing RSLs and the response rate of thirty six percent provided one hundred and twenty one responses (118 were valid). The lack of correlation between the expected proportional spread of organisational size and the sample was the result of a sampling error. To reduce the effect of this error in the data it was decided to group the categories used in the original data collection into three bands – small, medium and large (table 6.8). This recoding is used in much of the subsequent analysis and is useful in that it allows

relationships to be studied between three notional sizes of organisation rather than six. These three sizes of organisation relate to the three sizes of organisations that were included in the grounded theory study.

Table 6-12: Recoded data for Size of RSL

Recoding of RSL size			
New Category	Number	Original Category	Number
Small	24	26-100 units	7
		101-250 units	17
Medium	36	251-1,000 units	19
		1,001-2,500 units	19
Large	57	2501-10,000 units	40
		Over 10,000 units	17

Hypothesis 5: The large RSLs are increasing their share of the development sector

Exploration of the data suggested large organisations are more likely to be involved in large scale development of social housing. Consideration of the average size of development shows the size increasing with the size of organisation. If this reflects a trend in the population, then this is likely to have an effect on the way in which social housing is procured. To investigate this phenomenon, a null hypothesis is proposed, that each size of organisation has an equal chance of being involved in any size of development.

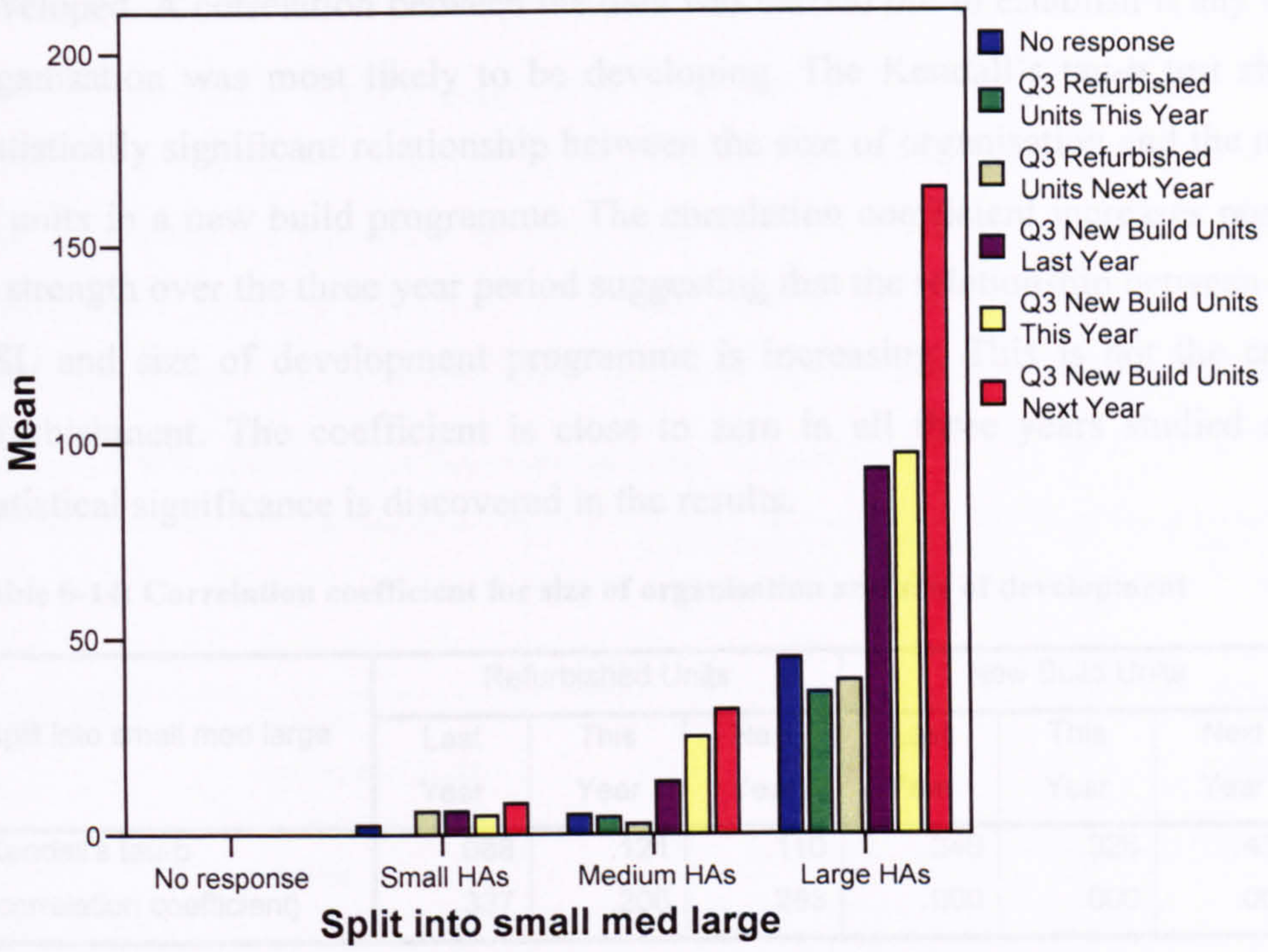


Table 6-13: Mean and std.dev. of development programme by size of RSL

Split into small med large		Refurbished Units			New Build Units		
		Last Year	This Year	Next Year	Last Year	This Year	Next Year
Small RSLs	Mean	2.50	.00	6.00	6.00	5.00	8.00
	N	2	2	2	2	2	2
	Std. Dev	2.121	.000	8.485	8.485	7.071	11.314
Medium RSLs	Mean	4.70	4.00	13.44	17.28	29.08	33.46
	N	20	18	18	25	26	24
	Std. Dev	6.334	6.444	46.803	22.850	34.229	46.121
Large RSLs	Mean	42.98	37.26	38.33	90.87	96.34	157.84
	N	49	50	48	55	56	56
	Std. Dev	176.782	143.822	147.679	127.798	109.305	188.787
Total	Mean	30.62	27.25	30.35	65.57	72.48	116.36
	N	72	71	69	83	85	83
	Std. Dev	146.523	121.375	125.595	110.402	96.466	167.754

Analysis of the organisations that were conducting development was necessary to reveal relationships between the size of organisation and the number of houses they

developed. A correlation between the data was carried out to establish if any type of organisation was most likely to be developing. The Kendall's tau-b test shows a statistically significant relationship between the size of organisation and the number of units in a new build programme. The correlation coefficient increases positively in strength over the three year period suggesting that the relationship between size of RSL and size of development programme is increasing. This is not the case for refurbishment. The coefficient is close to zero in all three years studied and no statistical significance is discovered in the results.

Table 6-14: Correlation coefficient for size of organisation and size of development

Split into small med large	Refurbished Units			New Build Units		
	Last Year	This Year	Next Year	Last Year	This Year	Next Year
Kendall's tau-b	.088	.121	.110	.346	.326	.452
(correlation coefficient)	.337	.206	.283	.000	.000	.000

The analysis rejects the null hypothesis for new build but cannot find any statistically significant relationship for the refurbishment programme. This supports the view that the large RSLs are increasingly responsible for large development programmes.

Within the social housing sector, there is a trend towards the large organisations increasing in size. Many organisations have merged to form national housing associations increasing their share of the development market. Predictions are that large organisations will eventually push the small associations out of the development sector. This remains to be seen, but the analysis suggests that there is a trend towards large RSL increasing their development programmes. This factor is an important contextual consideration for the development of SD policies and will be considered in more detail in the following section.

6.7.3 Sustainable Development Policies

The data revealed a high percentage of RSLs without a SD policy. This was balanced by a similar percentage of organisations intending to develop one. Analysis was conducted to establish if there was any relationship between the size of organisation and the existence of a SD policy. Table 6.15 illustrates a cross tabulation of the two variables, *Size of RSL* and *Sustainable Development policy.*

Table 6-15: Size of RSL * Sust Development Policy Crosstabulation

		Sust Development Policy			Total
		Yes	No	No response	
Small RSLs	Count	6	16	1	23
	Expected Count	10.3	12.5	.2	23.0
	% within Recode to SML	26.1%	69.6%	4.3%	100.0%
Medium RSLs	Count	15	21	0	36
	Expected Count	16.1	19.6	.3	36.0
	% within Recode to SML	41.7%	58.3%	.0%	100.0%
Large RSLs	Count	30	25	0	55
	Expected Count	24.6	29.9	.5	55.0
	% within Recode to SML	54.5%	45.5%	.0%	100.0%
Total	Count	51	62	1	114
	Expected Count	51.0	62.0	1.0	114.0
	% within Recode to SML	44.7%	54.4%	.9%	100.0%
	% of Total	44.7%	54.4%	.9%	100.0%

Statistics		Value	Approx. Sig.
Nominal by Nominal	Phi	.279	.064
	Cramer's V	.197	.064
	Contingency Coefficient	.269	.064
N of Valid Cases		114	

The percentages indicate that as the size of organisation increases a higher percentage have a SD policy. Only 26% of small RSLs have a SD policy, whereas 55% of large RSLs and 42% of medium RSLs already have a policy. The large RSLs were the only group with a greater number of organisations with a SD policy then not (55% had a policy and 45% did not). A Cramer's V test was conducted to establish if a significant relationship existed between the size of organisation and the existence of a policy. The value of the coefficient is low (closer to 0 than 1) and the significance is more than 0.05. So, although the figures suggest a correlation, a significant relationship does not exist between the size of organisation and the existence of a sustainable development policy.

The length of time that a SD policy had been in existence is a measure of the maturity of the policy. One might assume that the older the policy it is the better established it is. The mean length of time a policy has been in existence was one year. Because of the small number of respondents that had SD policies over three years old, it was decided to combine the higher categories and recode the data to enable statistical tests to be performed. The recoded data was arranged into two categories – *up to one year* and *over one year*. This recoded data is used in the analysis of the features of sustainability.

Table 6-16: Recoding of Sustainable Development maturity

Recoding of SD maturity			
New Category	Number	Original Category	Number
Plan to develop	51	None	-
Up to one year	26	Up to one year	26
Over one year	26	1-3 years	23
		3-5 years	1
		5 + years	2

It is interesting to note that there have been two significant changes in the number of organisations that have sustainable development policies. Three years ago 24% of the survey sample adopted SD policies, a further 25% of organisations adopted them

one year ago. The remaining organisations are implementing them this year. The sudden increase in SD policies can be explained by their existence becoming a condition of development funding. The voluntary step changes that occurred one and three years prior to the survey are more difficult to explain. They may be a reflection on increasing levels of engagement with sustainable development in the social housing sector. The housing agencies have been responsible for high profile campaigns to embed sustainable development into all the work it funds. Depending on if you view the statistics positively or negatively, half of the RSLs had implemented SD policies before they were obliged to by regulation.

Hypothesis 1: Sustainable development policies are based on the triple bottom line – providing equal emphasis on environmental, economic and social aspects

The balance of SD policy was of interest because the housing agency policies are strongly in support of equal merit being given to social, economic and environmental aspects of sustainability. The analysis of the data was carried out to establish if there was a correlation between the size of organisation, the maturity of a SD policy and the balance of the policy. The data was collated to represent the balance of the sustainable development policy. The respondents were asked to indicate the balance of their policy by allocating nine segments across the three aspects of sustainability – social, economic and environmental. Each response was combined into a single code, so a response of 3 (Environmental), 3 (Social), 3 (Economic) would be coded as 333. The data became more readily manipulated in this format.

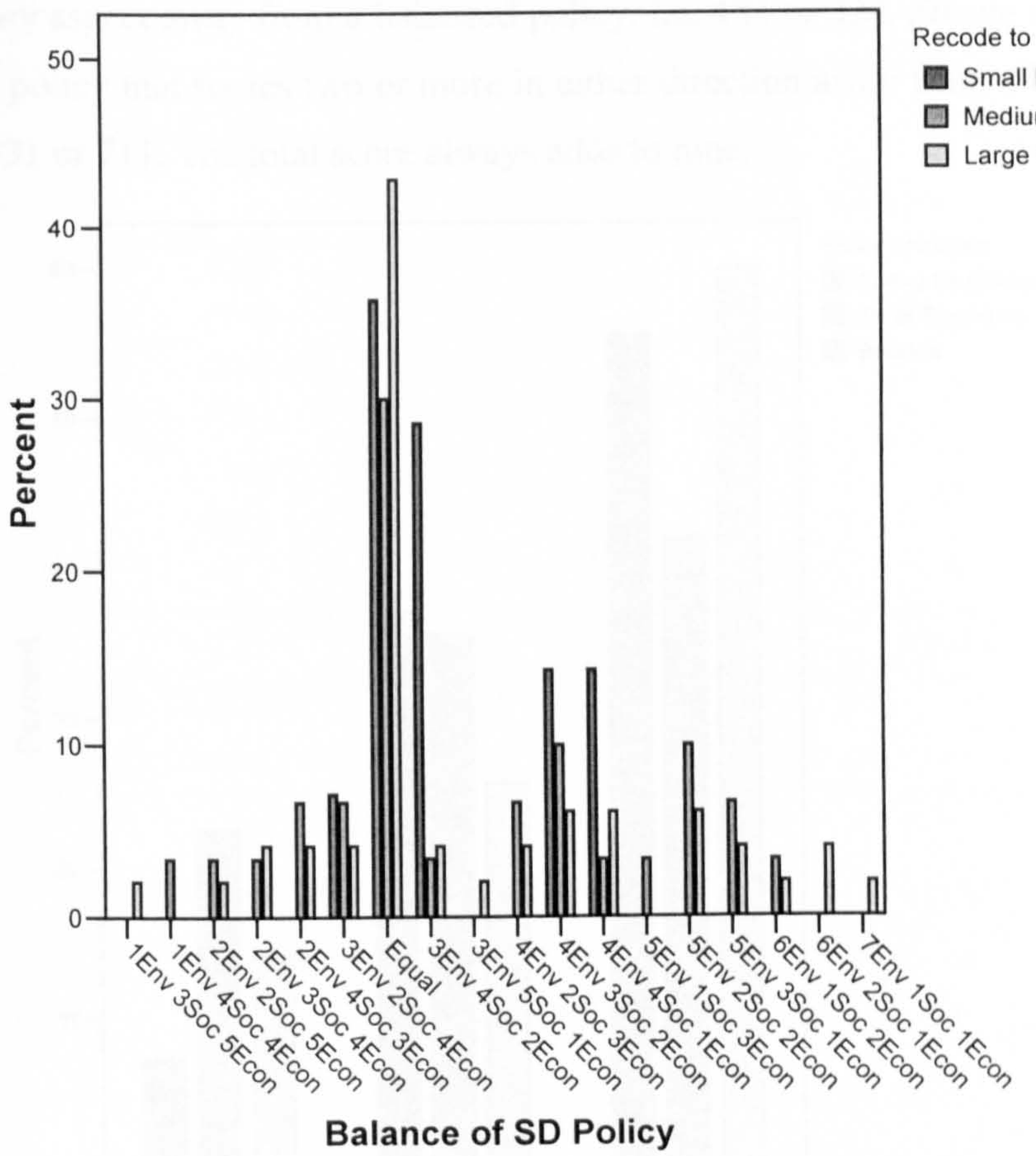


Figure 6-24: Balance of SD policies by Environment – Social – Economic split

In all sizes of RSLs a balanced policy is the most common. 30% of medium RSLs, 35% of small RSLs and 44% of large RSLs The spread of responses indicates that the small RSLs are more likely to have a balanced policy or one with small emphasis in one aspect of sustainability. The large and medium organisations show a wider spread of responses indicating greater extremes in their policies.

Because of the large number of permutations, it was decided to recode the variable to enable a better comprehension of the results. The data was organised to define the policy balance in three categories- balanced, small emphasis and strong emphasis. *Balanced* indicates a policy with equal scoring in each aspect of sustainability, i.e 333. *Small emphasis* represents a policy that scores either plus one or minus one in

any aspect away from a balanced policy, i.e. 432 or 324. *Strong emphasis* represents a policy that scores two or more in either direction away from a balanced policy, i.e. 531 or 711. The total score always adds to nine.

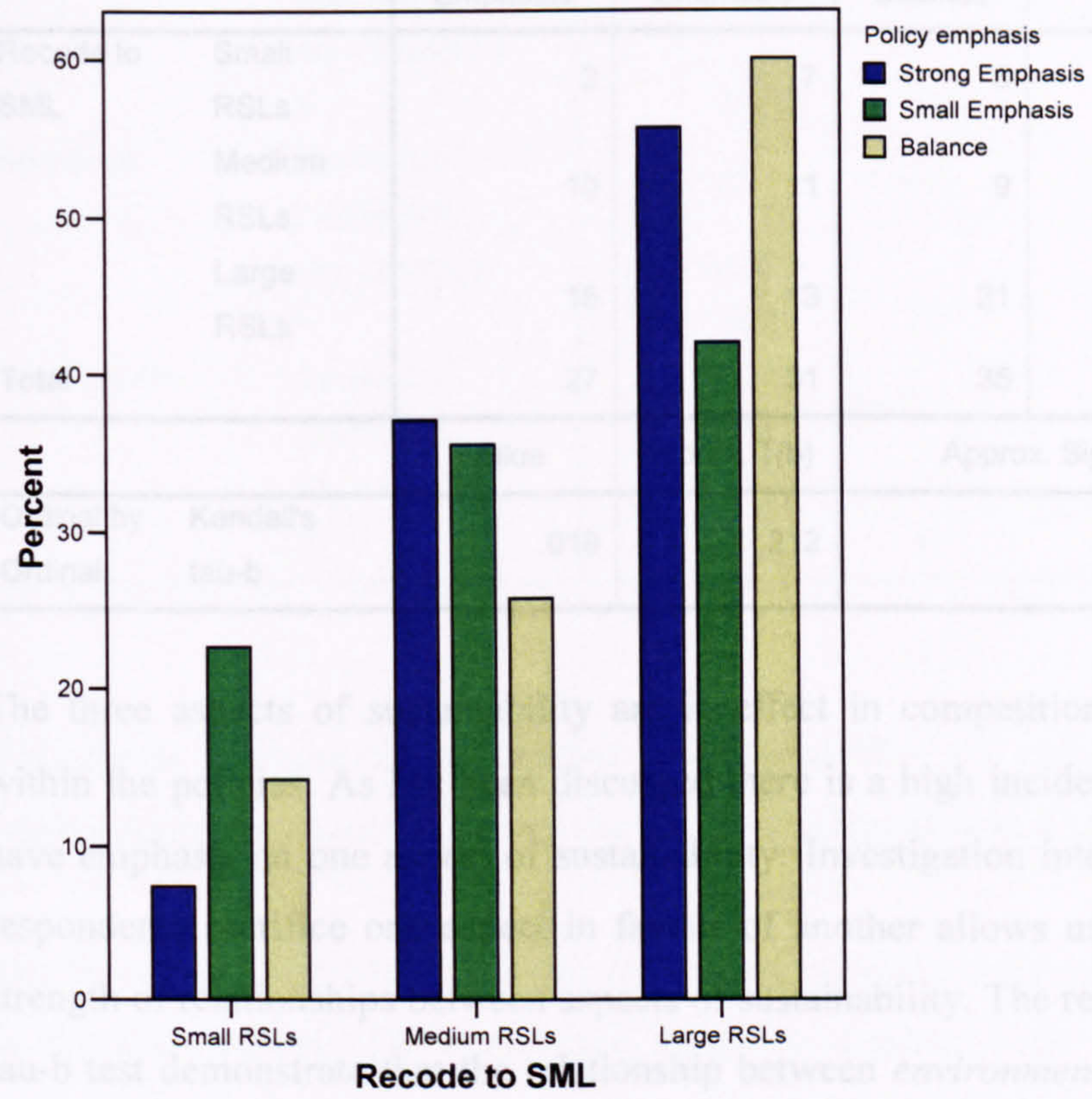


Figure 6-25: Balance of SD policy by size of RSL

Although balanced policies made up over a third of all responses (38%) , there was a high incidence of policies that had either a small (33%) or strong emphasis (29%) on one or more aspect of sustainability. The null hypothesis states that the RSLs would have policies that were not equally balanced. This null hypothesis cannot be rejected and it is clear that the balanced approach promoted by the housing agencies is not being implemented as standard. A correlation was conducted to determine if the policies that had strong emphasis in any particular aspect were linked to the age of a policy, but there was no significant relationship. The Kendall's tau-b test resulted in a very small positive correlation of 0.019 with a P of 0.832.

Table 6-17: Correlation of Policy emphasis and size of RSL

		Policy emphasis			Total
		Strong Emphasis	Small Emphasis	Balance	
Recode to SML	Small RSLs	2	7	5	14
	Medium RSLs	10	11	9	30
	Large RSLs	15	13	21	49
Total		27	31	35	93

		Value	Approx. T(b)	Approx. Sig.
Ordinal by Ordinal	Kendall's tau-b	.019	.212	.832

The three aspects of sustainability are in effect in competition with one another within the policies. As has been discussed there is a high incidence of policies that have emphasis on one aspect of sustainability. Investigation into the way in which respondents sacrifice one aspect in favour of another allows us to understand the strength of relationships between aspects of sustainability. The results of a Kendall's tau-b test demonstrate that the relationship between *environment* and the other two aspects of sustainability are the strongest and are statistically significant. Both correlations are negative, as would be suspected and *economic* and *environment* have the highest likelihood of being sacrificed in favour of the other. The relationship between *social* and *economic* aspects within the SD policy balance is not significant.

Table 6-18: Correlation of Social, Economic and Environmental aspects of SD policies

Kendall's tau_b		Social	Economic	Environment
Social	Correlation Coefficient	1.000	-.167	-.407(**)
	Sig. (2-tailed)	.	.062	.000
	N	95	95	95
Economic	Correlation Coefficient	-.167	1.000	-.547(**)
	Sig. (2-tailed)	.062	.	.000
	N	95	95	95
Environment	Correlation Coefficient	-.407(**)	-.547(**)	1.000
	Sig. (2-tailed)	.000	.000	.
	N	95	95	95

Hypothesis 2: Some of the features of sustainability are related – the strongest relationships are found between the features integrated in a paradigm model

The fourteen features that emerged from the grounded theory study were presented in the RSL survey. There presence sought to confirm their importance and to establish a ranking. In order to establish a ranking of the features, a weighting exercise was carried out on the data. The five-fold Likert scale was scored from one to five. This established that *energy efficiency* was the highest ranked feature of sustainability. The lowest ranked feature was *recycling*. This simple analysis is useful to provide a mean score for each feature. However analysis of the spread and strength of responses can be used to understand the relationship of categories with the respondents and establish if there is any link with the size of organisation or maturity of SD policy. A bivariate correlation was carried out on the fourteen features (Appendix B). A Cramer's V test revealed the strength of relationship and the statistical significance of the relationship. Each feature was tested against the thirteen other features. The exploratory approach revealed the pairs of features that had a high correlation coefficient. A strong positive correlation indicates that

respondents are likely to score highly in one category if they have scored highly in another.

In the grounded theory study certain features had been brought together to form components of the grounded theory. Additional analysis sought to measure the strength of the relationship between certain features and establish if this relationship was particularly strong with any size of RSL. The sets of features from the paradigm models were analysed for their strength of relationship. The Kendall's tau-b was used and the results for each group of features are presented below.

The features of *energy efficiency*, *insulation* and *fuel poverty* were combined into the 'Energy efficiency' paradigm model that constitutes one component of the grounded theory of sustainability in the social housing sector. The correlation coefficient is reasonably strong for each pairing of the three features and the probability of this having occurred by chance is so small it is negligible. This confirms the relevance of combining these three features in a paradigm model.

Table 6-19: Correlation of Sustainability features in Energy efficiency paradigm model

Kendall's tau_b		Energy Efficiency	Fuel poverty	Insulation
Energy Efficiency	Correlation Coefficient	1.000	.485(**)	.493(**)
	Sig. (2-tailed)	.	.000	.000
	N	98	97	98
Fuel poverty	Correlation Coefficient	.485(**)	1.000	.456(**)
	Sig. (2-tailed)	.000	.	.000
	N	97	98	98
Insulation	Correlation Coefficient	.493(**)	.456(**)	1.000
	Sig. (2-tailed)	.000	.000	.
	N	98	98	99

The other paradigm models combined features of sustainability. Correlations were carried out on the responses to these pairs and trios of features to establish if they were generally considered to relate to one another. *Feedback* and *Involving tenants*

were combined in an 'Involving tenants' paradigm model. Three other paradigm models were created from other sets of features. *Funding* and *Rent levels* (Financial factors); *Community facilities; Mixed development;* and *Mixed tenure* (Community Development); and *Building standards* and *Quality of Specification* were combined. The responses in the survey have confirmed the relationships that emerged from the grounded theory. Each of the pairs or trios of sustainability features has a correlation coefficient with at least medium strength and a statistical significance to the relationship. In other words the correlation had not occurred by chance.

Table 6-20: Correlation of Sustainability features in Involving tenants paradigm model

Kendall's tau_b		Feedback	Involving tenants
Feedback	Correlation Coefficient	1.000	.517(**)
	Sig. (2-tailed)	.	.000
	N	96	96
Involving tenants	Correlation Coefficient	.517(**)	1.000
	Sig. (2-tailed)	.000	.
	N	96	99

Involving tenants has one of the strongest correlation in the responses between its features. The features on the 'Financial factors' model are less strongly correlated. This might be explained by the disparity in the character of the features, while the 'Involving tenants' features have a great deal of similarity.

Table 6-21: Correlation of Sustainability features in Financial Factors paradigm model

Kendall's tau_b		Funding	Rent Levels
Funding	Correlation Coefficient	1.000	.383(**)
	Sig. (2-tailed)	.	.000
	N	98	98
Rent Levels	Correlation Coefficient	.383(**)	1.000
	Sig. (2-tailed)	.000	.
	N	98	99

Table 6-22: Correlation of Sustainability features in Community Development paradigm model

Kendall's tau_b		Community Facilities	Mixed development	Mixed Tenure
Community Facilities	Correlation Coefficient	1.000	.317(**)	.185(*)
	Sig. (2-tailed)	.	.000	.032
	N	97	95	95
Mixed development	Correlation Coefficient	.317(**)	1.000	.749(**)
	Sig. (2-tailed)	.000	.	.000
	N	95	97	97
Mixed tenure	Correlation Coefficient	.185(*)	.749(**)	1.000
	Sig. (2-tailed)	.032	.000	.
	N	95	97	97

Mixed tenure and *Mixed development* were very strongly linked by respondents, whereas *Mixed tenure* and *Community facilities* had a weak correlation. These features were connected by the common feature of *Mixed development* (Table 6.22). The 'Design Quality' paradigm features have a reasonably strong correlation amongst the respondents.

Table 6-23: Correlation of Sustainability features in Design Quality paradigm model

Kendall's tau_b		Building Standards	Quality of spec
Building Standards	Correlation Coefficient	1.000	.424(**)
	Sig. (2-tailed)	.	.000
	N	99	99
Quality of spec	Correlation Coefficient	.424(**)	1.000
	Sig. (2-tailed)	.000	.
	N	99	99

** Correlation is significant at the 0.01 level (2-tailed).

The correlation analysis highlighted additional significant correlations that had not been expected. The pairing of features (Table 6.24) reveals another layer of complexity in the inter-relationship of the features of sustainability. Each of these pairs of features indicates that if a respondent ranked one feature highly then they were likely to rank the paired feature highly. These correlations help to understand

some of the complex relationships that exist between the multiple features of sustainability emerging out of the grounded theory exercise.

Table 6-24: Additional correlations existing between features of sustainability

Kendall's tau_b		Correlation Coefficient	Sig. (2-tailed)
Maintenance	Building standards	.420	.000
	Involving tenants	.438	.000
	Quality of spec	.535	.000
Mixed development	Involving tenants	.407	.000
Recycling	Insulation	.411	.000
Rent levels	Feedback	.419	.000
	Involving tenants	.442	.000

One of the strongest correlations is evident between the feature of *Maintenance* and *Quality of specification.* There is a clear link between these features to do with the life expectancy of the building components. This is an issue that came out strongly in both features in the grounded model.

Hypothesis 6: The maturity of sustainable development policy has an influence over the features of sustainability that are essential to a social housing project.
In an earlier section it was suggested that there might be a relationship between the length of time the policy had been in place and the emphasis placed on the features of sustainability. Five of the fourteen features of sustainability appear to be effected by the age of a policy. The strongest correlation exists in the feature of *building standards.* In all cases there is a shift in emphasis from *important* in the planned policies to *essential* in policies over one year old. This indicates a statistically significant increase in the relevance of these features to the RSLs that have operated policies for a greater length of time. The assumption being that their experience has caused these features to gain more relevance.

Table 6-25: Correlation between Feature of sustainability and maturity of SD policy

Kendall's tau_b		Correlation Coefficient	Sig. (2-tailed)
Maturity of SD policy	2. Building standards	.229	.010
	11. Mixed tenure	.215	.017
	12. Mixed development	.211	.021
	1. Energy efficiency	.193	.034
	14. Rent levels	.180	.038

It is interesting to note that in the overall ranking of these features, two of these features are considered most important and three are considered least important. However all of them are receiving increased relevance in longer established SD policies.

6.7.4 Partnering and Sustainability

The survey questioned respondents on what type of partnering if any was carried out by the RSL. Data was collected on strategic and project partnering and five potential partners in each area. The data was again analysed to establish if any relationship could be found between the size of organisation and the type of partnering. The data was analysed to establish if the same RSLs were involved in project partnering and strategic partnering.

Hypothesis 3: The features of partnering from the literature deliver benefit through the procurement system

Ten features of partnering that had emerged from the literature review were considered for the benefit that they offered the procurement system as opposed to traditional contracting. The features were weighted using a scoring system from 1-4 in the same manner as the features of sustainability. This process enabled the features of partnering to be ranked in order of benefit they provided to the procurement system (table 6.24). *Working relationships, Improved trust* and

Reduced conflict were considered the three main benefits of partnered procurement. Least benefit was gained through the features of *Time savings, Community gains* and *Financial savings.* Perhaps not surprisingly there is a strong correlation in responses between *Working relationships* and *Improved trust* (K= 0.547, P= 0.000). Although they are not closely ranked, *Working relationships* and *Housing Quality* also have a strong correlation coefficient(K= 0.549, P= 0.000).

Table 6-26: Ranked Features of Partnering

Category / Feature	No Benefit (1)	Minor Benefit (2)	Medium Benefit (3)	Major Benefit (4)	Total Score
1. Working relationships	0	8	22	71	**366**
2. Improved trust	2	10	37	51	**337**
3. Reduced conflict	3	9	40	47	**329**
4. Design processes	2	15	38	44	**322**
5. Construction processes	3	8	52	36	**319**
6. Housing quality	6	13	44	38	**316**
7. Culture change	9	21	41	28	**286**
8. Time savings	18	25	34	22	**258**
9. Community gains	15	30	35	19	**256**
10. Financial saving	20	26	38	16	**250**

Hypothesis 4: Partnering is a more appropriate procurement approach for delivery of sustainability

The perception of the link between the three approaches to procurement and sustainability reflect the respondents view on the most appropriate procurement approach to deliver sustainability. The mean response to both statements put partnering in the strongest position in relation to sustainability. The consistency of response achieved by the two questions enhances the understanding of the attitude held in regard to procurement approaches. It is out with the scope of this research to measure specific project performance, but the perceptions held by the development managers must impact on their choice of procurement approach for planned work.

Hypothesis 7: The experience an RSL has of partnering has an influence over their perception of its ability to deliver sustainability

It was assumed that partnering practice would have an influence on the perception of the approaches to procurement and their link to sustainability and whether they are able to deliver sustainability. Each form of procurement was correlated with the types of partnering that had been undertaken by a respondent RSL. Strong correlation coefficients indicate that experience of partnering practice has provided a more positive view of a procurement approach and its link or ability to deliver sustainability. The coefficients and statistical significance are presented in Table 6.27.

Without exception, all those that had experience of partnering agreed that partnering had a link to sustainability and it could deliver sustainability. Although this result is an expected result, it does confirm that the perceptions of partnering are borne out in practice. The strongest correlations were found in respondents that had partnering experience with sub-contractors and suppliers.

The correlation between traditional contracting and partnering experience generated the highest number of correlations that were not statistically significant. Those with either project or strategic partnering experience generally rejected the link between traditional contracting and partnering. There was a moderate increase in respondents agreeing the link between design and build and partnering, although most of the agreement came from respondents with strategic partnering experience.

Experience of partnering appears to provide greater confidence in its ability to deliver sustainability as opposed to design and build or traditional contracting. The greatest confidence correlations were evident in RSLs that had partnered with sub-contractors or suppliers. This seems to support the view that the supply chain is critical to the delivery of sustainability conceptualised in chapter three.

Table 6-27: Correlation of partnering experience and perception of procurement approaches

		Partnering		Design and Build		Traditional	
Project Partnering – Link with Sustainability	Consultant	.368	.002	.242	.083	.231	.103
	Contractor	.369	.001	.254	.054	.281	.030
	Sub-contractor	.611	.000	.306	.079	.288	.092
	Suppliers	.420	.002	.296	.058	.323	.188
	Other RSLs	.362	.009	308	.024	.235	.124
Project Partnering – Ability to deliver Sustainability	Consultant	.405	.002	.311	.015	.317	.022
	Contractor	.415	.001	.328	.008	.325	.000
	Sub-contractor	.556	.000	.385	.021	.373	.027
	Suppliers	.422	.004	.354	.021	.306	.074
	Other RSLs	.419	.004	.374	.006	.299	.043
Strategic Partnering – Link with sustainability	Consultant	.404	.001	.270	.065	.188	.249
	Contractor	.429	.001	.257	.077	.179	.264
	Sub-contractor	.633	.000	.373	.030	.239	.195
	Suppliers	.574	.000	.356	.023	.273	.106
	Other RSLs	.404	.002	.294	.043	.221	.162
Strategic Partnering – Ability to deliver sustainability	Consultant	.448	.001	.369	.010	.343	.018
	Contractor	.465	.000	.311	.025	.330	.021
	Sub-contractor	.584	.000	.530	.000	.397	.019
	Suppliers	.619	.000	.514	.000	.412	.007
	Other RSLs	.436	.001	.323	.027	.295	.049
Note: shaded cells indicate no statistical significance							

6.8 Summary of findings

The survey was intended to triangulate the findings of the grounded theory study that established features of sustainability in social housing procurement. It has been possible to broaden the comprehension of sustainability from a project perspective. Some of the key findings of the survey provide insights into the perceptions of practitioners involved in the delivery of sustainability through construction projects. The development managers questioned are representative of the UK social housing

sector and the findings provide a generalised view of the social housing sector. Some of the key findings are set out below:

- Individual Sustainable Development policies are most commonly based on the triple bottom line – providing equal emphasis on environmental, economic and social aspects
- Some of the features of sustainability are related – the strongest relationships are found between the features integrated in the paradigm models
- The features of partnering from the literature deliver benefit through the procurement system
- Partnering is a more appropriate procurement approach for delivery of sustainability
- The large RSLs are increasing their share of the development sector
- The maturity of sustainable development policy has an influence over the features of sustainability that are essential to a social housing project.
- The experience an RSL has of partnering has an influence over their perception of its ability to deliver sustainability

The survey collected a wide range of data on sustainability and partnering in the social housing sector. A range of statistical tests were used to analyse the data.

- SD policies are not emerging out of the RSL sector according to the balanced approach advocated by the housing agencies. The RSLs perceive that their policies are balanced in only a third of all cases. This did not seem to be related to the age of the policy or the size of the RSL.
- Environment came through most strongly in the emphasis of the policies and social and economic aspects were sacrificed in favour of environment in the balance of SD policy perception. When questioned on the features of sustainability an alternative model of sustainability was established to determine the priorities the RSLs place on them. In contrast to the balance of

policy, social features predominated and a new aspect of sustainability emerged strongly. Technical sustainability essentially focuses upon the procurement processes and transcends social, economic and environmental aspects.

- The maturity of the policy seemed to increase the relevance of five of the features of sustainability. Mixed tenure, mixed development, building standards, energy efficiency and rent levels all became more significant to policies that had been in existence for longer. Although without more evidence to support the claim, these features may have increased in relevance because of the knowledge gained by the RSL over the time that they have operated their SD policy.
- According to RSLs partnering delivers major benefits to working relationships and improving trust in the procurement system. Least benefit is accrued in terms of financial and time savings and community gains. RSLs have more confidence in the ability of partnering to deliver sustainability than design and build or traditional. This view is reinforced by the RSLs who have partnering experience. There is a strong correlation between experience of partnering and confidence in its ability to deliver sustainability.

6.9 Reflections

The questionnaire was conducted at a stage in the research process when the grounded theory study had produced fourteen features grounded in the data. These features were confirmed through repeated analysis of the data and there is confidence that these features are representative. The questionnaire provided the opportunity for respondents to add their own features and only five new features were suggested and only two of these were considered essential.

The data collected on the features of sustainability was analysed using a simple scoring system. The score allocated was based on an interval scale that did not take into consideration the 'real' distance between the scores. Interpretation of the

categories may lead to different scores depending on the perception of the respondent. This issue is discussed by Calder (1996) and while it is agreed that subjective data should be treated as ordinal data there is a general acceptance that this type of data is most readily analysed using an interval scale. If the data collected on the features of sustainability through the questionnaire had amounted to a greater proportion of the whole thesis it might have been appropriate to devise a more complex method of data treatment.

The responses to the links between sustainability and certain forms of procurement provides a useful insight into the perceptions of where sustainability can be best delivered. This analysis would become more meaningful if it was supported

The range of data provided opportunity for further statistical testing. The range of possible tests means that a researcher could spend so much time conducting tests on the data that the final analysis is no longer relevant to the initial aims of the research. The process of deciding which tests to use involved stepping back from the analysis process and clearly defining what was to be tested. A great deal of time was spent looking at the results and considering the relationships that were apparent by simple comparison of the graphs. The existing patterns were used as the basis of designing the tests. It was obvious where relationships seemed to exist. The tests are just a mathematical way of confirming or refuting the relationships as statistically significant.

Chapter 7 A Consensual Sustainability Model

7.1 Introduction

This phase of research develops and tests a decision support tool for use in the procurement system. The tool provides a framework for making sustainability features explicit to those involved in procuring social housing and provides a means to reaching consensus on the relative importance of those features. The development of the tool incorporates the research approaches used in the previous two phases of research reported in Chapter 5 and 6.

The approaches are combined to develop a Consensual Sustainable decision support tool (ConSus) for use in the procurement of social housing. The tool can be used to establish and prioritise the features of sustainability that are important for the procurement of a social housing project. This chapter reports on the development and testing of the ConSus decision support tool within the social housing sector.

The development of ConSus is based on the "Delphi method". This is a systematic, intuitive forecasting procedure used to obtain, exchange, and develop informed opinion on a particular topic. The original Delphi method is based on the collection of feedback from experts in a given area. It involves a series of stages. After each stage has been completed, the results are made known to the rest of the group before a second iteration of the process. After each round the experts refine their opinions and a broad consensus emerges. This is taken to be the opinion of the group. This process has the aim of allowing the "experts" involved in an individual housing development to arrive at consensus on what sustainability means for social housing at that level. ConSus develops this idea by incorporating a qualitative element to the collation of issues relevant to the stakeholders. Ultimately it is envisaged that the decision support tool may be used from a single project through to strategic planning of a large scale development programme. This will allow the overall mapping of sustainability features back to policy level.

7.2 Relationship to Conceptual Framework

The Soft Systems approach (SSM) is cyclical in nature. It is designed to model and test systems in order to identify change that would improve the system. The iterative approach is useful for the constantly changing environment of the procurement system and the evolving concept of sustainability. SSM acknowledges the political and social 'systems' that influence the 'system' under study and strives to include this influence within ConSus. This is achieved by conducting the study with the people directly affected by and contributing to these systems. The result is a model that effectively incorporates the influences that are key to the decisions made within the procurement system.

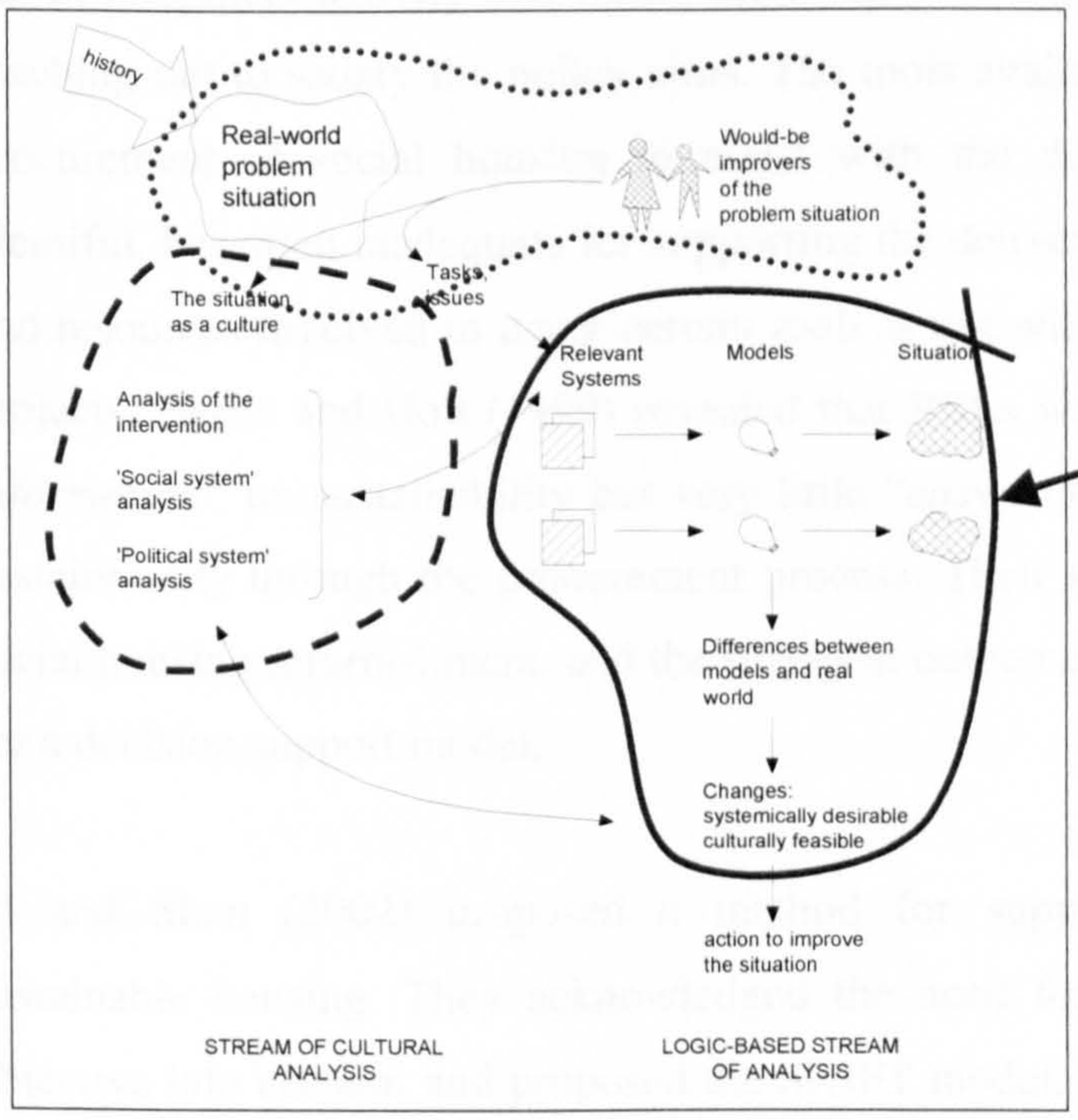


Figure 7-1: Phase 3 research within SSM Framework

ConSus incorporates the stages of SSM used in the previous two phases of research. The qualitative research carried out in the grounded theory study provided a method to establish features of sustainability grounded in the social housing sector. This

approach was used to develop a model within SSM. The quantitative research, conducted for phase three of the research, tested ConSus in a world situation. One of the main outcomes of the survey was the ranking of the features of sustainability. Reflection on these two phases of research provided the grounds for the development of the consensual sustainability decision support tool. A pragmatic approach is adopted to provide a practical solution that is developed and then tested in a real world situation according to principle of SSM.

7.3 Justification of research approach

Chapter 5 identified the significant differences that are found between policy and practice in the understanding of sustainability. Ultimately the goal must be to carry out development activity that meets the immediate aspirations of the project while reaching out to satisfy the policy aims. The tools available to those involved in the procurement of social housing to assist with the delivery of sustainability are plentiful, but often inadequate for supporting the delivery of sustainability. The time and resources involved in using certain tools is out with the scope of many smaller projects. Harris and Holt (1999) revealed that RSLs were provided with *a "glut of information"* on sustainability but very little *"easy to follow"* advice on delivering sustainability through the procurement process. Their study focused on sustainable social housing refurbishment, and the strongest outcome of their research was a need for a decision support model.

Li and Shen (2002) proposed a method for supporting decision making in sustainable housing. They acknowledged the need for taking multiple goals and objective into account and proposed the SHIFT model. The essence of this model is the selection of preferred alternative policy actions by using *fuzzy set theory*. The problem that exists with the use of this model is that the attributes must be weighted and this in itself is an extremely subjective process. The authors of the model do not define who weights each attribute or category within the model. The systematic evaluation of categories seeks to follow a multi-attribute approach but fails to

incorporate the opinions of participants in an iterative manner. The outcomes of using such a model are expressed numerically. This processes incorporated within the model make it difficult for the components of the result to be traced backwards. The model lacks transparency and does not encourage stakeholders involvement in the process.

Ding (2005) proposes a multi-criteria approach to the measurement of sustainability. The proposed sustainability index model is based on four criteria and depends on a weighting mechanism to establish if a solution is sustainable. Environmental issues and financial considerations are given equal chance of consideration within the model. The outcome of the model is again numerical. The process requires the user to transfer each subjective argument into a numerical equation. The outcome of the model is a sustainability index for a solution. The value score is derived from a complex weighting exercise which removes the transparency from the process. The outcome is subject to value laden error that, if used incorrectly, could lead to a less sustainable solution being adopted.

The procurement of construction is based on a quantitative foundation measured in monetary units. Within the constraints of a project budget it is necessary to make choices between what is desired and what is feasible. Because of the complexity of a project there are a number of decisions that must be weighed against one another to establish the priorities. It is clear that neither a fully qualitative approach nor a quantitative approach is able to reach into the heart of the problem in isolation.

Barrett *et al.* (1999) used a Delphi study to prioritise a sustainability research agenda. The research they undertook involved the use of two panels of experts involved in sustainability research. Their approach adopted a combined qualitative and quantitative analysis framework. The research aimed to establish a consensus view of sustainability from a national and international basis. The use of Delphi, although not fully reported appears to have been successful in bringing together

subjective value laden views and organising them quantitatively. Dawood (2000) refers to the Delphi method as one of a group of 'Subjective Forecasting Techniques' These techniques are considered to be as accurate as statistical methods of prediction and are based on the judgement of experts. A joint approach methodology utilising Delphi method is used to develop a model for predicting cost indices in the Greek construction industry incorporating the subjective techniques with quantitative analysis. The model shows that the inclusion of subjectivity in the forecasting process, leads to improved accuracy.

This research adopts a similar approach, integrating the subjectivity of 'expert opinion' with a quantitative analysis of the results. This provides a tool for combining judgement into the decision making process systemically.

7.4 Methodology

This phase of research is concerned with the development and testing of Consensual Sustainability model. This approach will draw on the research conducted in Chapters 5 and 6 and address the research problem in a holistic manner. A Delphi approach is able to encompass both quantitative and qualitative data. A mixed methodology is integrated into the framework of ConSus.

Development of a Delphi based model seeks to address the financial framework of the procurement system by presenting those involved with a project a framework to explore emerging issues in a qualitative manner and then prioritise them using a quantitative method. This approach attempts to capture the subjective aspects of sustainability and place them into the quantitative procurement system in a transparent manner. This is aimed at presenting issues explicitly that are of importance to stakeholders within the procurement process. Each of these issues are prioritised and so a consensus position might be achieved for the group.

Delphi may be characterized as a method for structuring a group communication process so that the process is effective in allowing a group of individuals, as a whole, to deal with a complex problem. (Linstone and Turoff 2002)

Delphi Study is an approach developed as a forecasting tool to prioritise issues emerging out of complex situations. Delphi Study or the Delphi Technique was developed by the Rand Corporation, a research organisation funded by the US military. The technique was first used in the 1950's to forecast a post nuclear society. The Delphi concept is concerned with the use of expert opinion. The objective of a Delphi study is to "*obtain the most reliable consensus of opinion of a group of experts ... by a series of intensive questionnaires interspersed with controlled opinion feedback.*"

It is a technique that is used to develop a shared view of a complex problem. It involves a combination of data collection, prioritising of issues and iterative feedback. Delphi can be used to evaluate a past event or forecast the outcome of a complex situation. It main strength is the learning process furnished by the evaluation of a topic by a panel of experts (Coccia 2000).

Controlled Feedback

Delphi differs from an ordinary polling procedure. Feedback is gathered from the group and individuals are given the opportunity to modify or refine their judgments based upon their reaction to the collective views of the group. Thus an iterative process is developed to lead the participants towards a consensus on a complex issue. Each respondent completes the questionnaire and then the entire groups responses are compiled to provide a ranking of views. The results are circulated to the group. Additional comments and categories are made available at this time.

A Delphi may be interspersed with a forum or workshop designed to allow opinions to emerge on the rankings. This approach has the benefit of incorporating a much stronger qualitative base into the research, than can be achieved by the use of questionnaires alone.

Each iteration involves the collection of feedback on a group of topics and a statistical analysis of the results. The process can be repeated until consensus has been achieved.

Anonymous Response

One of the strengths associated with a Delphi study is that of anonymous response. This is designed to prevent a dominant individual having a persuasive effect on the group. This aspect of the study is thought to encourage greater freedom to express personal opinion. This in turn means that the response will be based on the individual's expertise rather than the corporate position of the individual's organisation. This is especially relevant when individuals from a single organisation are brought together for a Delphi, but it makes as much sense to provide anonymity to a broad participant population.

The scope of the study will determine the level of anonymity that may be provided. A Delphi that makes use of in-person workshops will remove the opportunity for complete anonymity. However in a well designed study the participants are assured of the anonymity of their responses to the questionnaire. This study has been conducted using a mixed mode. A face to face workshop was used to establish issues and an anonymous questionnaire has been utilised to rank the issues. Delphi technique is designed to cope with complex and sensitive issues. The anonymity of the questionnaire allowed participants to rank issues without the influence of corporate pressure.

7.5 The Consensual Sustainability decision support tool

The Consensual Sustainability decision support tool (ConSus) is developed to integrate a consensus into procurement decision making to ensure an equitable representation of sustainability in a housing project.

7.5.1 The ConSus decision support tool

The aim of this phase of research was to develop a model to make the features of sustainability explicit for a project or programme of development. ConSus is designed to allow a group of individuals to share their expertise. It is based on a Delphi study and incorporates a qualitative and quantitative analysis framework.

ConSus is designed to provide an interactive tool for use in establishing sustainability for a specific project or programme. The ultimate product of ConSus is the features of sustainability that are then used to prioritise decisions within the procurement process. For ConSus to be effective it is understood that it would have to be as simple and quick to use as possible to make it a useful tool for improving delivery of sustainability. The social housing sector is inundated with information on implementing sustainability. The need for a simple and effective way of integrating sustainability in the decision making process was identified while reviewing the literature. ConSus has been designed to be visually simple to understand and use, and quick to compile responses.

ConSus follows an iterative process. It is envisaged that the decision support tool could be used to formulate policy or prioritise development decisions at programme or project level. The conclusion of each use of ConSus can then be used to assess the expressed priorities of a single project against the overall sustainability priorities of a programme or policy. The use of ConSus is iterative and can be used repeatedly until consensus has been reached. Sustainability priorities may evolve and change over time. It is possible to integrate the use of ConSus into policy planning or annual

development cycles to revisit the issues that were prioritised and consider if they are still relevant.

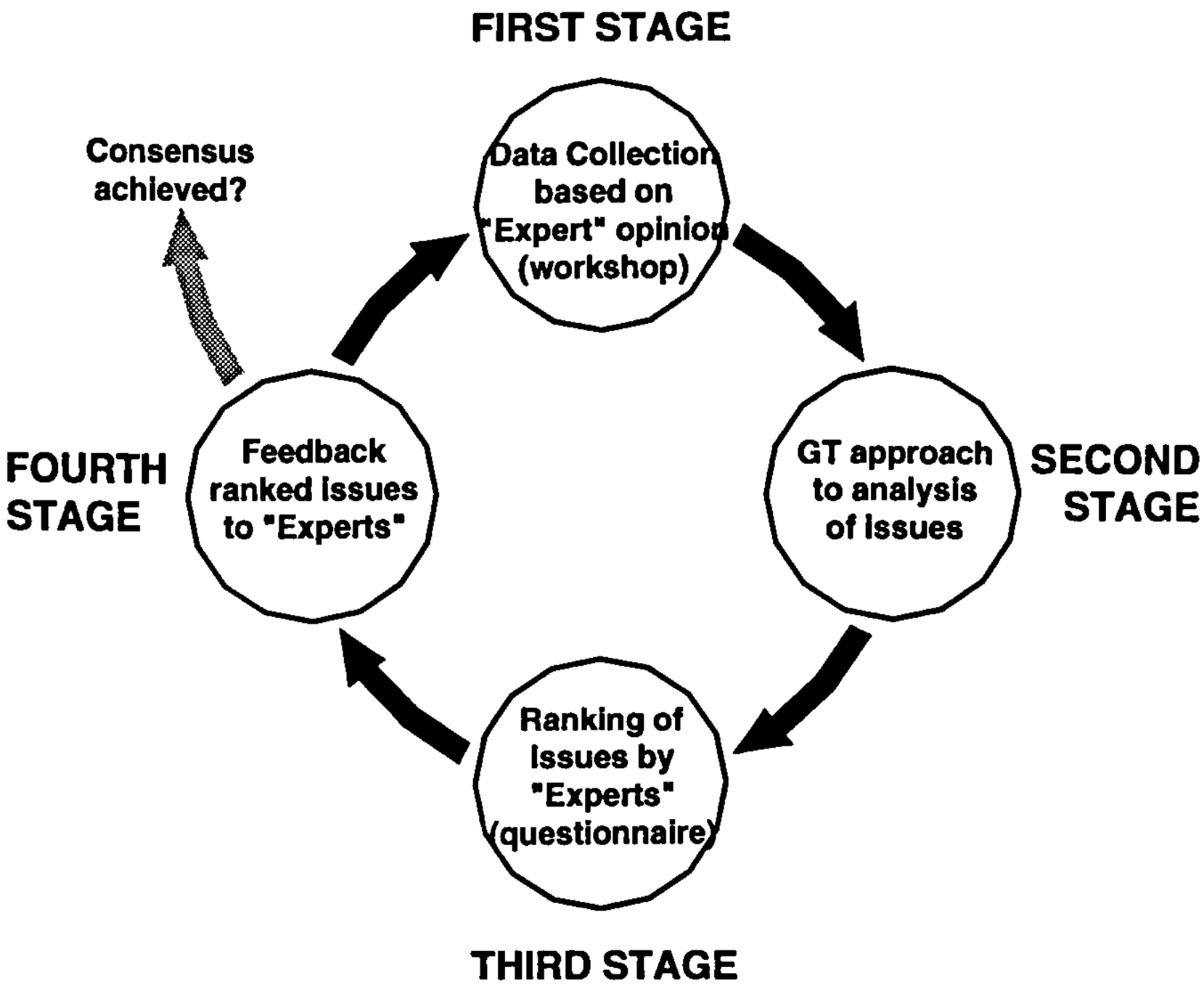


Figure 7-2 : A single iteration of ConSus

ConSus involves a four stage process -Collection of opinions; analysis of issues; ranking of issues; and feedback of issues. The ConSus decision support tool involves the use of a workshop to collect the opinions of participants. This format is designed to elicit a broad and representative range of issues for the group. The aim is to generate as many issues as possible that relate to sustainability in the procurement of a building project for the specific group of stakeholders. The issues are then analysed using the coding paradigm of grounded theory approach (Strauss and Corbin 1990). At this stage all issues are given equal status. The process results in a set of categories and sub-categories that are used as the basis of a ranking process. The third stage of the process is for participants to prioritise the issues emerging out of the first stage. The ranked issues are presented to the participants. At this stage

the participants are given the opportunity to provide further categories and provide their opinion on the responses. This process will either provide consensus on the issues or lead to a further iteration of the process (Figure 7.2).

The process may be repeated until consensus is reached or significant differences in opinion are identified. Each round is a complete iteration of the process. The "experts" are given the opportunity to consider the opinion of the group and either moderate their view in reaction to the opinion of the group or argue their position to try and change the opinion of the other participants. The 'argument' put forward is assumed to be based on the 'expert' opinion of the participant and aims to minimise subjective bias.

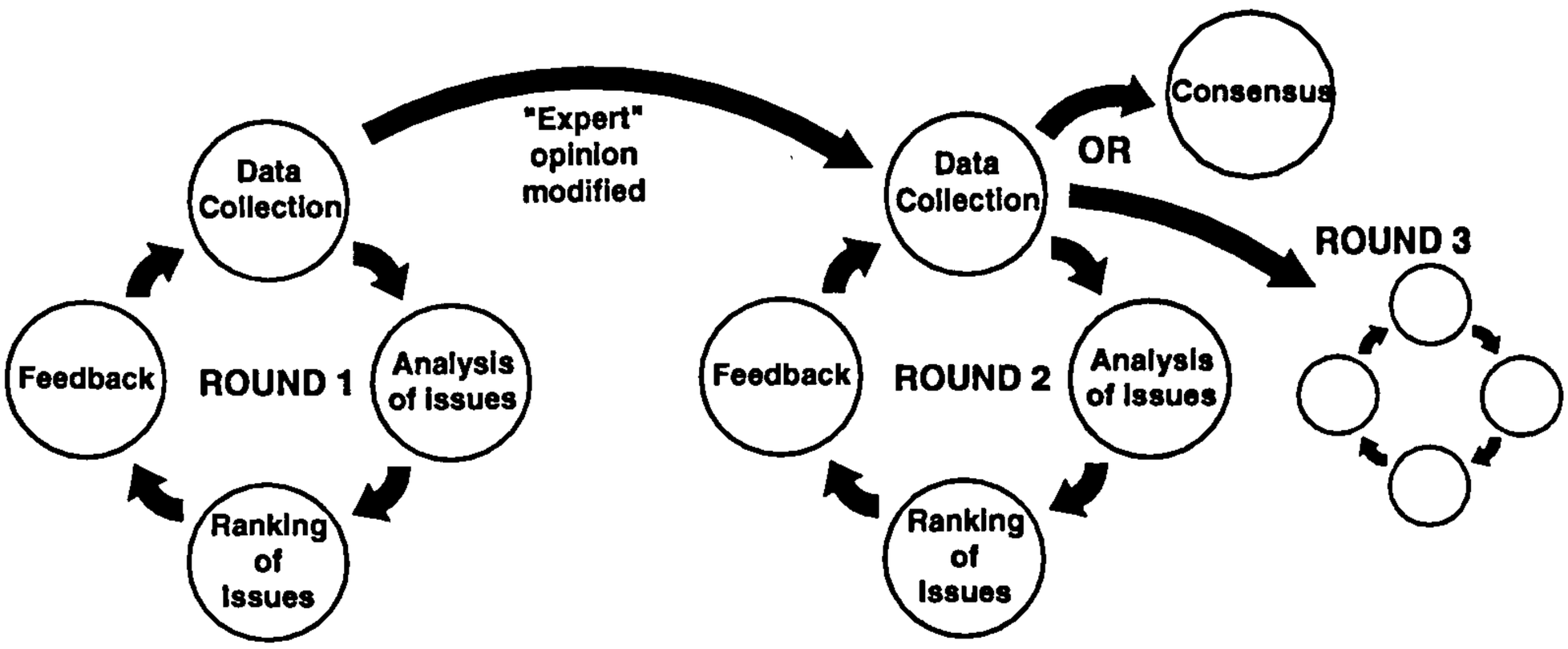


Figure 7-2: Process use of ConSus

ConSus may be used by any number of participants. Delphi studies have been conducted successfully with ten participants (Hatush and Skitmore 1997, Chan *et al.* 2001) but there are cases of up to three hundred people involved in large scale studies. In the procurement of a project it is possible for all project stakeholders to be involved in use of ConSus. However selection of the panel is cited as one of the critical success factors of a Delphi. The process is based on the use of expert opinion, in essence an educational exchange for all those involved. Incorporation of

individual's without expertise will potentially result in a decision framework based on non-credible opinion. The difficulty with selection of participants lies with the judgement of their 'expertise'. The participants for the initial use of ConSus were self selected following participation in the survey that constitutes phase two of this PhD study (Chapter six). Their expertise was assumed to be concurrent with their status as development manager and their expression of interest in the research.

The participants were widespread geographically. Because of this, it was decided that a web-based application was ideal to provide an accessible and interactive format for the study.

7.5.2 Use of the Internet for research purposes

The web is increasingly being used as a medium for research. The tools available allow research data to be collected more quickly, for less cost and it is suggested that a better rate of return can be achieved. Web-based surveys have increased in use since 1995 and the supporting technology is improving with development. The tools are only recently being used in construction management research. Yet it has been successfully employed in consumer research and commercial applications for a number of years. Increasingly academic research is relying on the internet for gathering research data. In a survey conducted in 2002 (Roztocki and Morgan) of academic attitudes to web surveys, the majority believed that web surveys are more efficient and the overall quality of response was at least as high as traditional paper surveys.

All surveys are subject to sources of error. Web-based surveys are no different. Typical errors are found in coverage and sampling, non-response and measurement. Coverage and sampling error are a result of the difficulty in identifying a sample that is representative of the population and that has equitable access to the technology to enable them to participate in the survey. Non-response can occur for a variety of reasons. Participants can drop out of the questionnaire process at any point. Poor

graphics and the "flow" of the questionnaire itself are two main sources of non-response. Measurement error is a function of poorly worded questions (Manfreda et al. 2002) and is associated with all types of survey.

One of the main advantages of web-based surveys over paper surveys is the data is in electronic format and is collated as the returns are received. This contributes to having data available at a much earlier date than is possible with a paper survey. This function of web-based surveys is useful for large scale studies and assists in reducing errors with in-putting of data.

Ethical Issues

Ethical consideration must be given to any piece of research. There are particular areas of concern for web-based research. The Association of Internet Researchers (AOIR) has produced a guide for ethical decision-making and internet research. This goes through various key issues. The most prominent issue is one of privacy. Web research can be conducted with relative ease across the entire globe and hence is carried out in countries with differing ethical and privacy standards. Participants in European Union must provide unambiguous consent (AIOR 2002:7) while in the USA there are far less stringent requirements. Participation in this study is by prior invitation and therefore the standards of privacy are satisfied. Anonymity is maintained for participants and although it is feasible to trace respondents with the use of software 'cookies' this technology has not been used for the ConSus support tool.

The application was developed using Macromedia Dreamweaver® and the use of html files. The development of a website allowed a range of support information to be included to allow participants access to as much or as little information as was required. This added to the flexibility of the support tool and increased the user functionality. The participants were provided with information but were not obliged to refer to it to access ConSus. Links were available to the housing agencies'

sustainable development policy documents and various other sources of information on sustainability related to the development of social housing. Information on the Delphi method was also made available to ensure that the process was transparent and the participants understood fully the aim of the exercise. (Figure 7.3).The website reported on the initial workshop and directed the participants to complete a questionnaire which constitutes the first ranking phase of the ConSus model.

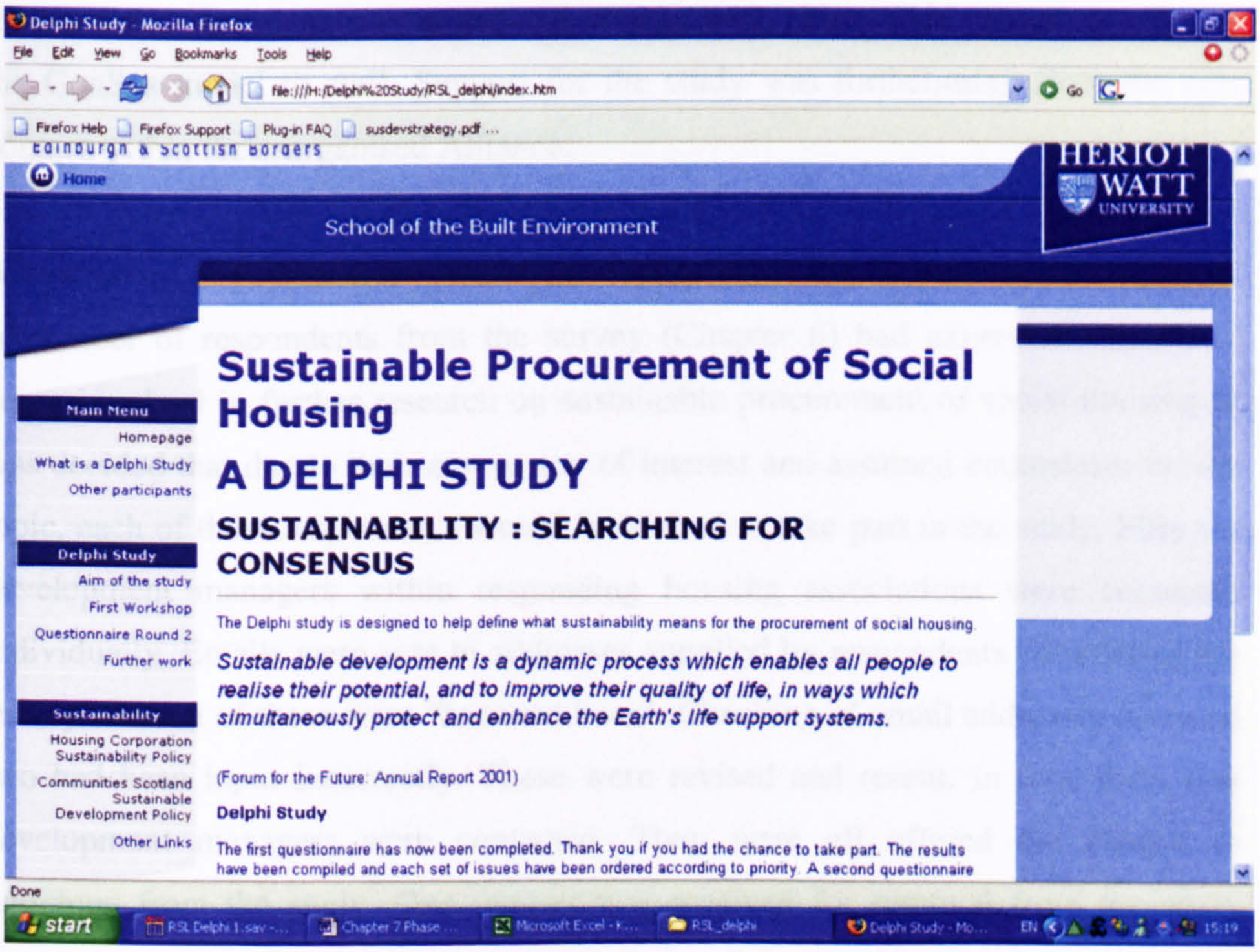


Figure 7-3: Screenshot of ConSus core page with links to additional information

7.5.3 Selection of participants

The original group of experts were drawn from an alliance of housing associations involved in a flagship partnered development programme. The initial plan was to develop ConSus for use by the partnering organisations to agree the features of

sustainability that would form the foundation of the sustainable development policy for the alliance's development programme.

The first workshop was conducted in mid 2004. This event was a successful meeting and provided the foundations for the ConSus model. Following the workshop, the alliance of housing associations invited to take part in the Delphi study were involved in a strategic reorganisation. The main contact for the Delphi study was replaced and significant organisational change took place. This caused the trial of the ConSus model to stall. Support for the study was forthcoming from the new contact within the reorganised Alliance.

A new group of experts was selected in order to allow the Delphi study to continue. A number of respondents from the survey (Chapter 6) had expressed interest in being involved in further research on sustainable procurement of social housing. It was decided that due to their expression of interest and assumed enthusiasm for the topic, each of these respondents would be invited to take part in the study. Fifty six development managers within responding housing associations were contacted individually. Emails were sent to addresses supplied by respondents completing the survey. Fifteen of these were 'bounced back'. Checking of email addresses revealed two had been input incorrectly. These were revised and resent. In total forty five development managers were contacted. They were all offered the chance to withdraw from the study. One request was received for removal from the study database and one had stopped working for one of the specific housing association. Forty three development managers have been included for inclusion in the study.

7.5.4 First Workshop

The first stage in the use of the ConSus model was a workshop that was held with invited participants to discuss and develop a range of issues relating to sustainability in the procurement of social housing. These issues would form the basis of the first round of the questionnaire. The original Delphi method involves the researcher

compiling the list of issues from literature. This study uses an alternative approach, focusing on the grounded theory method and the importance of basing the system model on the cultural system that is central to SSM. The use of a workshop has the benefit of the issues used for the questionnaire coming from the participants – so called 'experts'. This ensures that the issues are grounded in the cultural system that forms the basis of the procurement system. It reduces the bias of the researcher and ultimately grounds ConSus within the procurement system rather than an observation or interpretation of the process.

The workshop involved five participants and two researchers. The format of the workshop was designed to promote a free flowing discussion in order to allow as many ideas and issues to emerge. The participants were asked to note down ideas, issues and features relating to the three main aspects of sustainability – social, environmental and economic. The use of this framework adopts the triple bottom line model (Figure 4.3) and orders the collection of data from the group into key areas that are well established in the sustainable development policies of the housing agencies.

Each aspect of sustainability was dealt with in turn. The participants were instructed to write down any aspect or feature that they believed was relevant to sustainability. The use of multiple 'post-its' encouraged the generation of a large number of responses from each participant. They were encouraged to use phrases, sentences or single words as they saw appropriate. Each data collection round was allowed fifteen minutes. At the completion of each round, the individuals were asked to attach their notes to a large sheet in groups of similar issues. Once all the ideas were presented, the group set to arrange the ideas into key areas. This process allowed the participant to review their output and consider a relevant grouping for each 'issue'. The process set up a discussion that brought out further ideas that were noted down by one of the researchers and added to the range of issues that had already been produced.

The workshop continued until all ideas had been exhausted. The workshop lasted for two hours and produced three hundred and twenty six categories. This process resulted in a 'mind-map' generated by the group for each of social, economic and environmental sustainability. The full lists of issues from this workshop may be viewed in Appendix C.

7.5.5 Analysis

Following the workshop the issues were transcribed and compiled into lists under the headings of social, economic and environmental. The issues that emerged out of the workshop were analysed using the coding paradigm developed for grounded theory. The first phase of this coding was effectively carried out by the participants in the group. As has been discussed above, the participants were asked to order their output with the rest of the groups output into similar areas. The use of decision makers in the procurement system to analyse the responses, effectively grounds the initial coding process in the procurement system.

The issues that emerged were categories that represented areas relevant to the participants. Further analysis made use of these categories and started to search for patterns and relationships that existed between different sets of categories. The original analysis framework was based on the triple bottom line model of sustainability. The subsequent analysis removed this framework and allowed the categories to be arranged in relationships that transcended the notional boundaries of the original framework. This promoted the development of new categories that captured a range of issues under new headings.

The analysis continued through several waves to arrive at a range of categories that were thought to represent the perceptions of sustainability from the participants at the workshop. The categories were arranged into a hierarchical structure. The main categories represented seven issues that predominated in the conversations. Each of these seven categories is populated by a range of sub-categories (Figure 7.4).

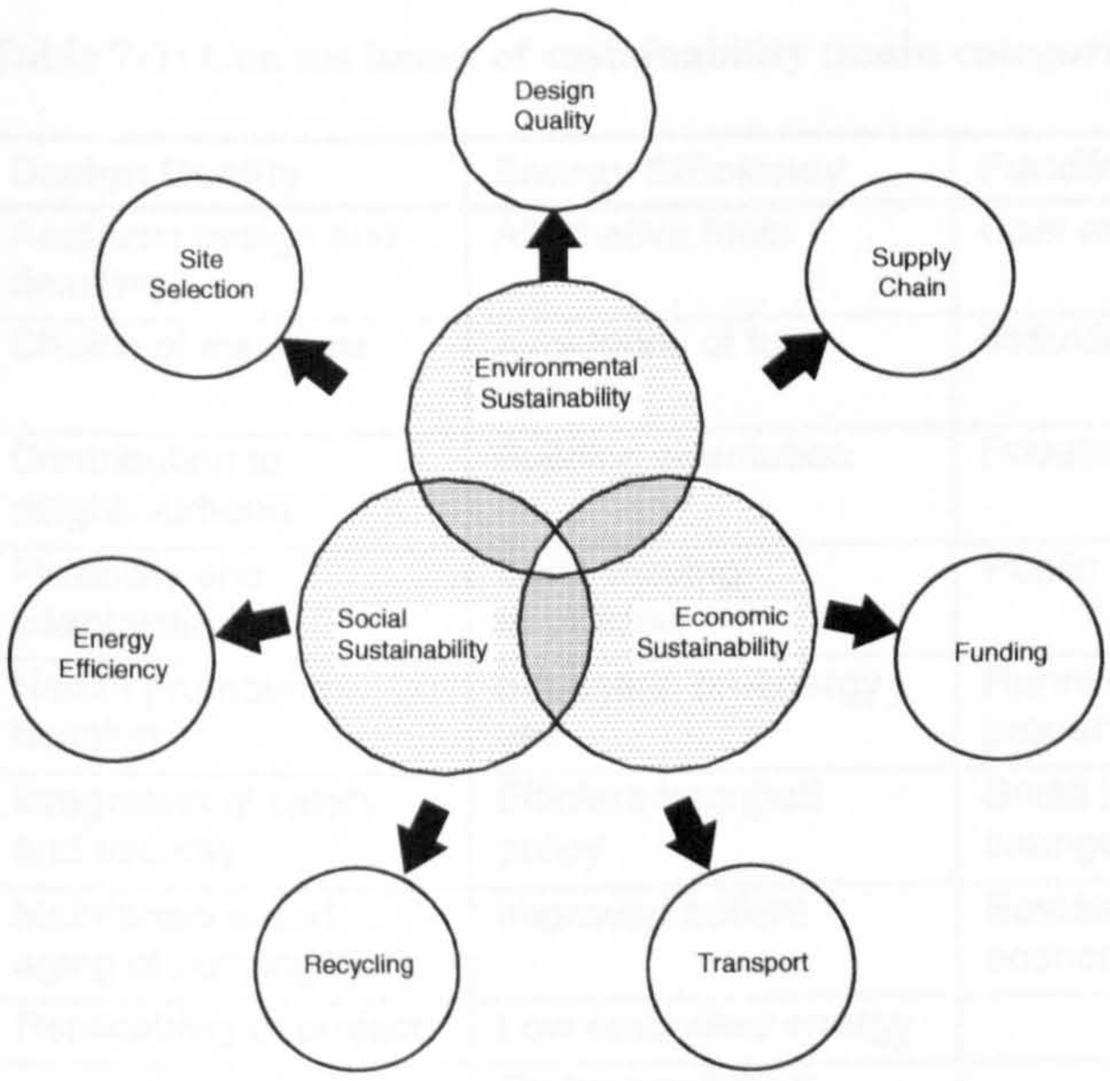


Figure 7-4: Data Analysis Framework for RSL Delphi

The categories that emerged from this analysis process represent the broad issues that the group generated to represent their views of sustainability. The sub-categories within these main categories expand each category to provide a framework of issues that apply to the procurement of social housing. The use of a framework that differs from the triple bottom line model encourages a 'bottom up' perspective to develop that is relevant to the individual project environment. The use of this approach to the development of ConSus grounds the whole process in the procurement system.

7.5.6 Questionnaire one

The seven categories and their sub-categories emerging from the analysis of the output of the workshop formed the basis for questionnaire one (Table 7.1). The respondents were asked to place the categories in order of their importance for the delivery of sustainability. The main categories were ranked first followed by ranking of the sub-categories.

Table 7-1: ConSus issues of sustainability (main categories in bold) in alphabetical order

Design Quality	**Energy Efficiency**	**Funding**	**Recycling**
Aesthetic design and detailing	Alternative fuels	Cost effective to build	Adaptability
Choice of materials	Avoidance of fuel poverty	Individual affordability	Demolition and demountability
Contribution to neighbourhood	Building orientation	Private funding	Energy from renewable resources
Flexibility and adaptability	Earth moving minimized	Public funding	Funding Sites with mixed use
Health promoting housing	Education on energy use	Running costs of property	Life cycle expectations
Integration of safety and security	Efficient transport policy	Small incremental change	Recycled materials
Maintenance and aging of buildings	Improved boilers	Sustaining local economy	Recycling by occupants
Replicability of project	Low embodied energy		
	Reduce polluting emissions		
	Reducing use of water		
	Thermal performance		
Site Selection	**Supply Chain**	**Transport**	
Affordable sites in area of need	Contractors site operations	Cost implications of transport issues	
Close proximity to contractors	Cost savings through the supply chain	Integrated within community	
Density linked to demand	Funding Sites with mixed use	Linked to transport network	
Integrated within community	Inclusion of local labour and contractors	Reduction in car use	
Links to transport network	Innovation through the supply chain	Transport consequences of the development process	
Local benefits of project	Renewable materials		
Redevelopment of sites	Transport of materials		
Site orientation and amenity			

The questionnaire was designed to take a maximum of ten minutes to complete. This aspect is important because it has been shown that participation in research is influenced heavily by the amount of effort that is required on the part of the

participant. By minimising the input at each stage there is an increased chance of maintaining participation. If ConSus is to be used iteratively by an organisation then it is equally important that the process does not prove time consuming. The majority of respondents completed all eight pages of the questionnaire. 13 respondents completed the whole questionnaire. 2 respondents omitted to complete one section of the survey (funding in one case and transport in the other case). One respondent only completed the first page. The average time spent completing it was seven minutes and the minimum time spent completing the whole survey was five minutes. The consistency in the time spent completing the survey provides a reasonably accurate time for completion. This design of the survey has been successful in minimising the time required to participate.

The questionnaire was designed to be visually eye catching and easy to understand. The construction sector is notoriously difficult to engage in research. This was a consideration in developing the web-based application. Research can be undermined by the use of a poorly designed research instrument. Use of colour differentiated the survey from simpler questionnaire templates available. The ConSus model was developed to a professional standard to make it a credible procurement decision aid.

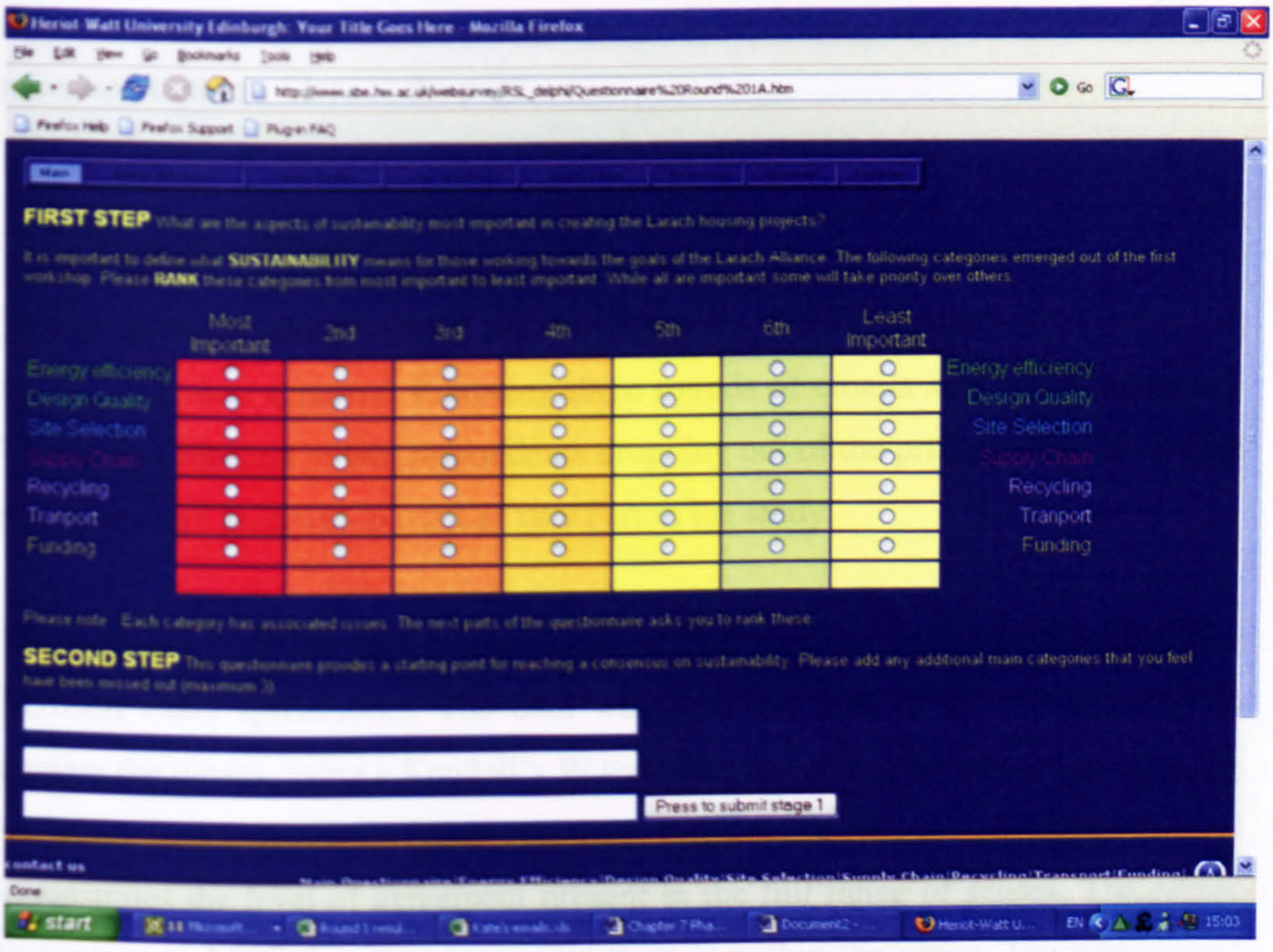


Figure 7-5: Screenshot of Delphi questionnaire round 1- page 1

The questionnaire was arranged in eight pages. The first page presented the seven main categories that emerged from the workshop. The following seven pages were the sets of sub-categories that related to the main categories. On each sheet the participants were asked to rank the issues. This was done by clicking on a bullet point. Because of the way in which the questionnaire had been designed, it was not possible to rank one category with two scores. It was possible to rank more than one category at the same level. This allows the participant to rank several categories equally if they believe them to be of equal merit. The negative aspect of this feature is that a respondent may accidentally rank two categories equally.

Following ranking of each category the respondents were asked to consider any areas that had not been included and were significant to the specific set of categories or sub-categories. The respondent was provided with three text boxes to input their

responses. The limitation to three areas promoted a focused approach rather than an inclination to throw ideas at the page.

7.5.7 Results: Round 1

The first questionnaire produced sixteen responses. This constitutes a response rate of 37%. This was achieved following three rounds of emails sent to all recipients. This process resulted in two respondents dropping out of the process. The remaining respondents are assumed to want to take part in the study.

The responses from the survey were emailed back and the data was compiled in a Microsoft excel spreadsheet. The data was imported into SPSS and analysed to compare the means, using a Kendall's W test. The use of this statistical test provides the mean score for each response and the coefficient of concordance that demonstrates the level of agreement present in the full range of scores. The closer the score is to 1.000 the more agreement there is within the group. The ranking for the main categories is presented in Table 7. 2. Design Quality; Energy Efficiency and Site Selection emerged as the top three categories. The Kendall's W for this ranking is 0.492 which does not demonstrate a very strong level of agreement amongst the respondents. The statistical significance is .000 which indicates that the ranking has not occurred by chance.

Table 7-2: Ranking of Main Issues for sustainability

Main Question	Ranking	Category	Mean Score
	1	Design Quality	2.45
	2	Energy Efficiency	2.91
	3	Site Selection	3.00
	4	Funding	3.09
	5	Transport	4.55
	6	Supply Chain	5.82
	7	Recycling	6.18
Kendall's W: 0.492 Significance 0.000			

The sub-categories were analysed in the same way. Firstly the ranking score was derived by calculating the mean score followed by the Kendall's W (Coefficient of concordance). The degree of agreement in the ranking of the main categories was not apparent in all the sub-categories. Design quality; Supply chain; and Recycling all had a low level of agreement on the ranking and the results were not statistically significant. The categories of Funding and Energy Efficiency received the highest level of agreement between respondents.

Table 7-3: Ranking of Design Quality sub-categories

Design Quality (Main rank 1)	Mean Rank	Kendall's W (significance)
1. Maintenance and aging of buildings	3.33	
2. Flexibility and adaptability	3.78	
3. Contribution to neighbourhood	3.83	
4. Integration of safety and security	4.33	
5. Aesthetic design and detailing	4.94	
6. Choice of materials	4.94	
7. Health promoting housing	5.17	
8. Replicability of project	5.67	.109 (.445)

Maintenance and aging of buildings emerged as the most important issue for within the main category of *Design Quality* (Table 7.3). The issues selected by the group in this category represent a broad understanding of *Design Quality*. The two most important issues within this category are to do with the future of the houses during their occupation cycle. The least important issue was the *Replicability of a project*. The ranking is based on a low coefficient of concordance and so this ranking is not especially significant for these categories at this stage.

Table 7-4: Ranking of Energy Efficiency sub-categories

Energy Efficiency (main rank 2)	Mean Rank	Kendall's W (significance)
1. Thermal performance	2.75	
2. Avoidance of fuel poverty	3.56	
3. Improved boilers	4.50	
4. Reducing use of water	4.88	
5. Reduce polluting emissions	4.88	
6. Education on energy use	5.88	
7. Low embodied energy	6.38	
8. Efficient transport policy	6.88	
9. Building orientation	7.88	
10. Alternative fuels	8.31	
11. Earth moving minimised	10.13	.437 (.000)

The ranking of *Energy Efficiency* categories received a reasonable degree of agreement amongst the respondents (Table 7.4). '*Thermal Performance*' and '*Avoidance of fuel poverty*' were ranked most highly. These issues are specifically targeted within the social housing agenda for improving the sustainability of new and existing projects. There appearance at the top of the ranking is significant in that the respondents have recognised and agree with the level of importance given to these categories by the housing agencies.

Table 7-5: Ranking of Site selection sub-categories

Site selection (main rank 3)	Mean Rank	Kendall's W (significance)
1. Integrated within community	2.88	
2. Affordable sites in area of need	3.25	
3. Density linked to demand	3.81	
4. Redevelopment of sites	3.88	
5. Links to transport network	4.06	
6. Site orientation and amenity	4.88	
7. Local benefits of project	5.50	
8. Close proximity to contractors	7.75	.404 (.002)

'*Integrated with community*' and '*Affordable sites*' emerged as the top two issues for the main category of *Site selection* (Table 7.5). These categories represent a strong social and economic bias to this category. The fundamental issue of using locally based contractors is the least relevant category to the respondents.

Table 7-6: Ranking of Funding sub-categories

Funding (main rank 4)	Mean Rank	Kendall's W (significance)
1. Sustaining local economy	2.22	
2. Cost effective to build	3.17	
3. Small incremental change	3.33	
4. Individual affordability	3.61	
5. Private funding	4.06	
6. Public funding	4.61	
7. Running costs of property	7.00	.496 (.000)

The ranking of the *Funding* sub-categories (Table 7.6) represents the highest level of agreement amongst the respondents. Naturally the categories represent economic sustainability most strongly, but the most important category is founded on social sustainability as it refers to improving the local economy rather than a specific financial objective of a project.

Table 7-7: Ranking of Transport sub-categories

Transport (main rank 5)	Mean Rank	Kendall's W (significance)
1. Integrated within community	1.78	
2. Linked to transport network	2.11	
3. Reduction in car use	3.33	
4. Transport consequences of the development process	3.83	
5. Cost implications of transport issues	3.94	.400 (.006)

Table 7-8: Ranking of Supply Chain sub-categories

Supply Chain (main rank 6)	Mean Rank	Kendall's W (significance)
1. Inclusion of local labour and contractors	3.11	
2. Cost savings through the supply chain	3.22	
3. Renewable materials	3.89	
4. Innovation through the supply chain	4.06	
5. Funding Sites with mixed use	4.33	
6. Transport of materials	4.39	
7. Contractors site operations	5.00	.096 (.523)

Although in the category of *Site selection local contractors* were considered least important in this category of *Supply Chain* it is considered the most important. The category itself received the least agreement and so the ranking is not particularly significant at this stage (Table 7.8).

Table 7-9: Ranking of Recycling sub-categories

Recycling (main rank 7)	Mean Rank	Kendall's W (significance)
1. Energy from renewable resources	3.10	
1. Life cycle expectations	3.10	
3. Adaptability	3.60	
4. Funding Sites with mixed use	4.00	
5. Recycling by occupants	4.30	
6. Recycled materials	4.70	
7. Demolition and demountability	5.20	.137 (.224)

For this set of sub-categories agreement was not strong on the ranking that emerged. The overall category was determined to be the least important of the main categories. The lack of agreement within this category perhaps reflects a lack of engagement with the issue in general. '*Life cycle expectations*' and '*Renewable energy*' were ranked jointly most important. The remaining sub-categories are concerned with the issue of the building at its reuse.

The sub-categories considered most important for each main category have a strong social bias. This reflects the results that have emerged out of the previous two phases of research (Chapter 5 and 6). The categories that cannot be specifically grouped under social sustainability have an environmental bias.

In themselves the results provide an interesting perspective on the views of a group regarding sustainability in the procurement system. However the correlation coefficients for the full range of results demonstrate a low to medium level of agreement within the group. The aim of the ConSus model is to assist a group in reaching consensus and the single iteration of the process has highlighted a range of different opinions on sustainability. This position determines that a further iteration of the ConSus model is required and a second questionnaire was compiled.

7.5.8 Questionnaire two

The results from the first questionnaire were used to create the second round questionnaire. The web-based template was modified to represent the ranking of sustainability issues, reflecting the mean response of the group. The first page of the questionnaire presented the overall ranking for the main categories. These were arranged from most important to least important. The subsequent questionnaire sheets were arranged to appear in the order of the main issue ranking, namely: **Design Quality; Energy Efficiency; Site Selection; Funding; Transport; Supply Chain; and Recycling.** Within each of these questionnaire sheets, the sub-categories had also been rearranged to reflect the group's ranking that had resulted from the first round questionnaire. In each questionnaire sheet, the target button for each category was already checked to reflect its relative importance. This gave the respondent the opportunity to submit the sheet without making alterations. By doing this they were expressing their agreement with the ranking of the categories.

The respondents were asked to consider the group's ranking and make any alterations to the level of importance that had been allocated to any of the categories.

7.5.9 Results: Round 2

The second round of the questionnaire produced a response rate of 50% from the first round respondents. This was achieved from two rounds of emails inviting participation in the second questionnaire. Five respondents completed the whole questionnaire and two completed only the main page. The response rate reflects a reasonable retention rate in the study. The trial of ConSus is not goal driven and there is not commercial pressure to remain within the study. The response rate then may be considered good considering participation is not linked to a specific project.

The majority of respondents indicated a total agreement with the ranking of the categories throughout all section of the questionnaire. Two respondents completed the main questionnaire sheet and their agreement is assumed for the sub-categories. Ideally explicit agreement would be gathered from all participants in the process. With implicit agreement there is a chance that later in the procurement process the individual may express dissatisfaction with a decision based on the consensus derived by use of ConSus. However, implied agreement provides a more robust position than a scenario with a high degree of explicit disagreement.

The ranking established by the group as a result of questionnaire one has proved acceptable to the group. Table 7.10 illustrates the level of agreement has increased on the ranking of these issues. The Kendall's W statistic is 0.939 (sig. 0.000) indicating a very high level of agreement amongst respondents. This has increased from a Kendall's W of 0.492 following the first questionnaire. The mean scores indicated in Table 7.10 that represent a whole number indicate total agreement for a category. Design quality, Energy Efficiency and Funding presented low levels of difference in opinion between the respondents.

Table 7-10: Consensus of Main Issues for sustainability

Main Question	Ranking	Category	Mean Score
	1	Design Quality	1.14
	2	Energy Efficiency	2.29
	3	Site Selection	3.00
	4	Funding	3.57
	5	Transport	5.00
	6	Supply Chain	6.00
	7	Recycling	7.00
Kendall's W: 0.939 Significance 0.000			

The sub-categories of each of the categories ranked in the main questionnaire received a total level of agreement for their ranking in all but one case. The ranking of issues (Table 7.3 – 7.9) was tested for level of agreement and in all but one case a Kendall's W of 1.000 (sig. 0.000) was achieved. This indicates total agreement between the group. The Design Quality sub-categories achieved a Kendall's W of 0.998 (sig. 0.000). This was as a result of on respondent shifting one sub-category from sixth to seventh position.

The second round questionnaire resulted in an almost complete agreement on the issues of sustainability and their relative importance in the procurement of a project. It was therefore not necessary to complete another iteration of the ConSus model. The ranked output of ConSus provides the group with a range of issues that represent their combined priorities of sustainability.

7.6 Analysis

The use of the ConSus model reveals seven main categories of sustainability that are important to the group of stakeholders involved in the trial. These issues are specific to the iteration of ConSus and represent the 'expert opinion' of those involved. This research has been concerned with the interpretation of sustainability at project level and the problem that the gap between policy and practice presents. The issues

emerging from the ConSus model are representative of a small section of the social housing sector and although not project specific (in this case) are potentially different to the grounded theory of sustainability developed in the earlier phase of research. For the ConSus model to integrate with the overall view of sustainability it is necessary to compare the features emerging out of the iteration with a broad view of sustainability to understand how a project contributes to the broader understanding of sustainability. The features from the ConSus model are compared with the grounded theory of sustainability developed in the earlier phase of research (Chapter 5). This framework allows the interpretation of sustainability of a project to be compared with a broader understanding of the concept.

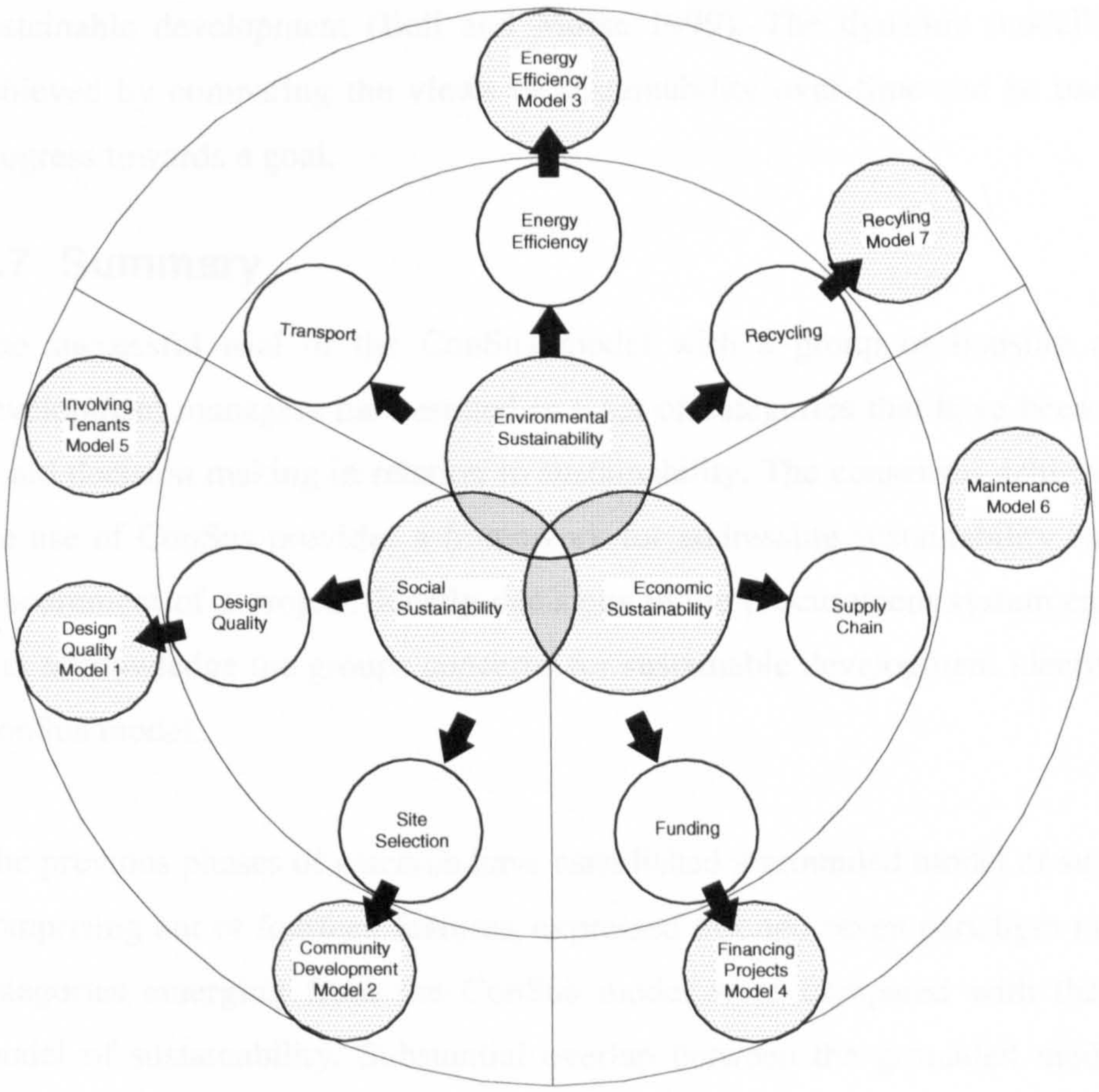


Figure 7-6: Analysis of ConSus Features and Grounded Model

Five of the seven categories developed in the ConSus model coincide with the paradigm models developed in the grounded theory. *Involving Tenants* (Model 5) and *Maintenance* (Model 6) did not emerge in the stakeholders taking part in the ConSus model. *Supply Chain* was developed as a category that did not correspond directly with the any of the grounded models, but elements of supply chain are contained within the *Design Quality* model and the *Maintenance* (Model 6). *Transport* is a new category of sustainability that is important to the stakeholders in this study that did not emerge in the grounded model.

The comparison provides an element of dynamic process to ConSus. The issue of moving towards the goal of sustainability is a preoccupation with those involved in sustainable development (Bell and Morse 1999). The dynamic modelling that is achieved by comparing the views of sustainability over time can be used to track progress towards a goal.

7.7 Summary

The successful trial of the ConSus model with a group of housing association development managers has resulted in a set of categories that have been prioritised to aid decision making in relation to sustainability. The consensus achieved through the use of ConSus provides a framework for addressing sustainability issues in the procurement of a project. Ideally decisions in the procurement system can be made that acknowledge the groups concerns for sustainable development identified by the ConSus model.

The previous phases of research have established a grounded model of sustainability comprising out of fourteen features, expressed through seven paradigm models. The categories emerging from the ConSus model were compared with the grounded model of sustainability. Substantial overlap between the grounded model and the ConSus model existed (Figure 7.6). Five of the paradigm models were directly related to five of the categories that had emerged out of the ConSus workshop. The

remaining categories of 'Transport' and 'Supply chain' had not emerged strongly in the grounded model, but were represented at the lower levels of the 'Design quality' model (paradigm model 1). The paradigm models of maintenance and involving tenants were featured as sub-categories in the ConSus model. The differences that have emerged are a function of the use of ConSus. The comparison between one set of features and another can be used to compare emphasis in one project to emphasis in another. This can be used to identify the profile that sustainability is assuming overtime.

The ConSus model prioritises issues within the procurement of a project and provides a framework for decision making. Its use allows subjective decision making to become more transparent and consistent throughout the procurement process. By identifying the group's priorities for sustainability and reaching consensus on the most significant issues, action can be focused by all parties involved in the procurement of a building project.

There is no guarantee that consensus will always be reached. The ConSus model provides the framework for identifying consensus or disagreement within a group of 'experts' or 'stakeholders'. If consensus is not reached by the use of ConSus then it could be argued that the impact of the disagreement can be lessened by the process of using ConSus, which allows an individual to express their opinion through the ranking and present their argument through the workshop or forum.

7.8 Reflections on the ConSus model

The results of the first round demonstrated a diversity of opinion. The second round of the questionnaire achieved a very high level of agreement for the group. Reaching consensus is the aim of using the ConSus model and this result can be viewed very positively. The group used to trial the ConSus model were self selected with a common interest in the subject. The group was not linked commercially. This may have had an influence on the ease in which the consensus was achieved. If this

model is to be useful in a commercial setting it has to withstand the influence of competing interests. In this situation consensus may not emerge as quickly. ConSus is also useful in identifying lack of consensus. It is unrealistic to expect agreement from a group of individuals in all cases. If the lack of consensus is formalised through the use of the ConSus model it can then be acknowledged and an appropriate course of action can be explored. This aspect would be an prove a strong test of the validity of ConSus and suggest an opportunity for further testing of ConSus.

The process has ignited further interest in two of the respondents who are potentially interested in being involved in further trials of the ConSus model within their organisations. This positive feedback provides confidence in ConSus and its ability to aid organisations 'making difficult decisions on how best to deliver sustainability through the procurement process.

Use of the ConSus model is designed to incorporate a workshop or forum to generate ideas. The trial of ConSus involved a small face-to-face workshop facilitated by two researchers. Analysis of the ideas generated through this workshop was conducted by one of the researchers. This produced the issues that are then fed into the questionnaire. Any researcher bias introduced into the analysis process is then removed through the anonymous ranking process. The facilitation of the workshop is an important feature in the success of ConSus. The ideas generated from the workshop should encompass every relevant aspect of sustainability and participants should be encouraged to think "outside the box". The web-based nature of the ConSus model suggests the use of an online workshop or forum. This aspect of ConSus may be built into a future generation of ConSus to make it a fully integrated application. This function would then be made available to groups as an alternative to a face-to-face workshop if preferred or if necessary. This combats the problems with a group that are geographically remote or have other difficulties in meeting.

Developing ConSus involved the use of html programming. Integration of the technology and data gathering proved challenging and ConSus will benefit from refinements to increase its functionality. Presently the data gathered is manually transferred into a database. For small scale research use this has not presented any difficulty. ConSus is to be developed to have integrated data processing and analysis. This will result in a model that is capable of producing a report following an iteration of the process. This feature will allow use of ConSus without a high degree of technical support.

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Chapter 8 Conclusions, Recommendations, Limitations and Reflections

8.1 Introduction

The research has combined a set of methodological approaches to address the central research problem. The outcomes of each phase of research have been designed to fit within the overall SSM framework. This chapter presents the conclusions reached from this work. The chapter is structured to present the main findings and show how the objectives of the research have been addressed. The relevance of the work for academic and practical purposes is then discussed with respect to the generation of new knowledge. Consideration is given to the limitations of this work and proposals for further work as a result of this research are presented. The chapter is concluded with final reflections on the whole process.

8.2 Main findings

The literature review identified two 'filters' to the delivery of sustainability through a building project. One, the interpretation of sustainability through the policy framework. Two, the procurement approach. The main strand of this thesis has focused on the first filter, the interpretation of sustainability in the social housing procurement process. The secondary strand of the thesis is the consideration of partnering and its ability to deliver sustainability. The research set out to address three questions:

1. What are the key features of sustainability for a social housing project?
2. How can sustainability be defined within the procurement system?
3. Is a collaborative or partnered approach to procurement the key to delivering sustainability?

Question 1 and 2 were concerned with the interpretation of sustainability in the procurement of a social housing project. Question 3 considers the ability of partnering to deliver sustainability.

The most significant finding from this research is the development of a grounded theory of sustainability from a project perspective. This theory comprises of seven phenomena grounded in social housing procurement. It provides an in depth understanding of sustainable development not previously published in the literature. This finding has confirmed the gap that exists between policy and practice in the delivery of sustainable development. The features of the grounded theory reveal a departure from the policy interpretation of sustainable development. The difference was found to be ingrained in the housing association development sector. Organisations own SD policy documents are developed on the premise of equal weighting to social, economic and environmental aspects of sustainability, yet their detailed perception of sustainability shows an emphasis on social and environmental factors. This gap confirmed the need for a framework to aid 'sustainable' decision making in the procurement of a building project in an attempt to close the gap.

Another key finding of the research is that partnering is believed to be the most appropriate form of procurement to deliver sustainability in social housing projects. Statistically significant evidence confirmed that the majority of development managers were convinced of this ability of partnering. This belief was based on the perception and experience of the respondents. As such the responses were the result of a subjective judgement. This subjectivity is evident in the procurement of a building project where a large number of decisions to do with sustainability are based on value judgments. This highlighted the need for a support tool to provide a structured approach to the delivery of sustainability.

The final contribution this research makes is the development of a model to aid decision making in the procurement of a building project. The grounded theory of

sustainability provides a set of general phenomena that contribute to the overall goal of sustainability. What is not clear is the level of agreement on these features in the procurement decisions of an individual building project. The ConSus model addresses this shortcoming by providing an interactive framework to prioritise sustainability features for a specific project. ConSus allows the procurement team to agree a set of features that represent sustainability for their particular situation and then decide through an iterative process which features are prioritised in the project. The use of the model with partnered procurement delivers optimum value from the expert knowledge contained in the project team.

8.2.1 Meeting the aims and objectives of the research

Aims and objectives of this research were identified in Chapter 1. The following section explains what has been done to address these specific objectives within the thesis.

Objective 1 - Explore how the global definition of sustainable development permeates the procurement of a building project

Although it was already known that the construction industry had a large part to play in the delivery of sustainable development, no established theory on how this should be achieved had emerged from the literature. The literature review (Chapter 2) explored the international development of the concept of sustainability. The early concerns for the global environment evolved into the international acceptance of the 'Bruntland' definition that incorporates social, economic and environmental aspects. The review covered the context of social housing procurement and a partnered approach to procurement. The outcome of the literature review was the identification of 'filters' to the delivery of sustainability in a building project. These filters were found to influence the transformation of globally defined sustainable development into a project level perception of sustainability (Figure 2.5). Four main filters exist between a housing project and the global definition of sustainability. UK Sustainable

Development policy and Rethinking Construction are the two high level filters associated with the development of sectoral policy within the social housing sector and the construction industry. The two filters most closely associated with the delivery of sustainability through a social housing project are **Interpretation of SD policy, and the Procurement Approach.** These filters form the main strands for investigation within this thesis. The issues raised by each 'filter' are addressed by the two subsequent objectives.

Filter 1 – The interpretation of sustainability at project level (main strand)
Filter 2 – The procurement approach (secondary strand)

Objective 2 - Investigate the relationships and connections between the procurement system and the global environment

The development of a systems view of the procurement process provides the conceptual framework for the thesis. SSM provides this conceptual framework and is used to develop a systems approach to the understanding of the procurement system within the global framework of sustainable development. The proposition from the literature review introduced the concept of filters to the understanding of sustainability in the procurement of a social housing project. This concept formed the basis of the development of a systems interpretation of the procurement of a housing project (Chapter 4). Systems thinking provided the framework for addressing the research questions and developed a picture of the procurement system within the global system. Later this allowed the features developed in the grounded theory to be traced for their impact on the global system.

Objective 3 - Establish the features of sustainability that are relevant to the procurement of social housing.

The grounded theory approach was used to establish the way in which sustainability is understood in the procurement of a social housing project (Chapter 5). The research methodology encouraged the development of a model grounded in the procurement system. The grounded model is made up of seven paradigm models that

explain the phenomena that relate to sustainability in the procurement of a building project. The concept of sustainability was defined by seven phenomena – **Design Quality; Community Development; Energy Efficiency; Financial Factors; Involving Tenants; Maintenance; and Recycling.** The features of these paradigm models were tested for their relevance, relationship and importance through a survey conducted with housing association development managers from across the UK (Chapter 6).

The survey confirmed the relevance of the features contained in the paradigm models and further confirmed the strength of relationship that existed between the features. The survey increased the comprehension of the features of sustainability by revealing their relative importance to delivery through the procurement system. It identified the features of **Energy efficiency; Building standards** and **Quality of Specification** as most important to the procurement of social housing. Energy efficiency is one of the key paradigm models of the grounded theory. Building standards and quality of specification were combined in another paradigm model. Correlations confirmed the strength of relationship between the other features that had been established in the paradigm models. The survey served to triangulate the findings of the grounded theory study. The detailed understanding of sustainability showed a predominance of social features with economic issues perceived as least important. The survey highlighted the tendency for individual sustainable development policies to mimic the main housing agency policies while the individual understanding of sustainability reflected a predominance of social factors.

The grounded theory study and the survey confirmed the gap between policy and practice by comparing the policy frameworks with the detail emerging on the understanding of sustainability.

Objective 4 - Investigate the benefits that are associated with partnering and consider the ability of the partnering process to deliver sustainability.

The benefits of partnering emerged from the literature and were tested for their relevance with the social housing sector. Contrary to the belief that partnering is able to deliver cost and time savings (Bennett and Jayes.1995), the housing associations perceived **Improved working relationships; Trust; and Reduced conflict** as the main benefits of partnering while time and financial savings fell at the bottom of the list of benefits. The belief in the 'social' benefits of partnering perhaps explains the position held with regard to partnering and sustainability. The national survey investigated the confidence that respondents had in the ability of partnering; traditional contracting; and design and build, to deliver sustainability. Overwhelmingly the social housing sector believed in the ability of **Partnering to deliver Sustainability.** The confidence in partnering was stronger with the group that had experience with partnering. Even with the level of subjectivity associated with both sustainability and partnering the perception is that partnering as an approach to the procurement of social housing is the most appropriate route to deliver sustainability.

Objective 5 - Develop a decision making framework to integrate sustainability into the development of social housing.

The grounded theory study established that understanding of sustainability differed significantly between the policies advocated by the social housing agencies and the perception at project level. This gap presents a difficulty for the housing agencies in assessing projects being put forward for funding, and for the housing associations attempting to gain funding. There is a need for a framework to define what sustainability means for a project so that it can be assessed and more importantly delivered through the procurement system. The ConSus model was developed to provide this framework (Chapter 7). It is based on the Delphi method and its mixed methodology allows the subjective elements of sustainability to be formalised into a framework to aid in the decision making process. **The ConSus model provides a**

set of issues ranked according to the 'expert' opinions of the procurement team. The issues are generated specifically for the project, programme or policy and represent a grounded view of sustainability for a particular situation and time. The benefit of the ConSus model is that all the issues generated are retained as a reference framework to base decisions against during the entire procurement process. It is a dynamic and flexible model designed to adapt to change within project or programme circumstance. Unlike some 'black box' models (Ding 2005; Chen *et al.* 2005), the output of this model is transparent and encourages the continued use of the framework throughout the procurement process.

The ConSus model provides a framework that responds to the individual criteria placed on each project. It can be used to develop policy frameworks against which individual project frameworks can be assessed against. Ultimately it is a model that responds to the process of time. Iterations of the model can be made for each new project within a programme.

8.3 Academic Relevance

This research was supported by a Richard Lay Fellowship from the RICS Foundation. The work contributes to the broad range of research commissioned by the RICS Foundation to address sustainability in the built environment (Upstream 2004; Edwards *et al.* 2004). The findings represent a clear step forward in terms of the understanding of sustainability from a project perspective. Where other published research on sustainability has focused on broad policy level initiatives, this research has advanced theoretical knowledge grounded in practice.

The findings of this research are to be published by the RICS Foundation in a 'précis' and a full length research paper. This will disseminate the research to a wide audience of RICS practitioners and fellow academics. A number of other publications are planned as a product of this research. A paper on the link between partnering and sustainability will be presented at a Joint CIB symposium on

'knowledge construction' in Helsinki, June 2005. Two journal papers on the issues arising from the research are being prepared. It is hoped to publish in leading international construction management journals to ensure the widest circulation of the main findings.

The research is set in the context of an emergent academic field. Research in sustainability of the built environment has increased rapidly since high profile conferences in 1992 and 1998 focused upon the changing face of sustainability. Calls for a change to the research agenda published over the last few years (nCRISP 2001; Fairclough 2002) have encouraged broader approaches to researching sustainability. This research has responded to the need by adopting an approach that has tackled social, economic and environmental features of sustainability.

During the course of the research five academic papers were published at leading international conferences. The initial paper (Carter and Fortune 2002a) contributed to the discussion on methodological approaches relevant to construction management in general and presented a rationale for a mixed methodology in sustainability research. This paper was presented 'best paper' in the 2nd International Postgraduate Conference on Research in the Built and Human Environment. The subsequent papers presented aspects of the research, including the development of the grounded theory (Carter and Fortune 2003) and data collection methods (Carter and Fortune 2004). Presenting the research at conferences provided an opportunity to gain useful feedback from colleagues and reflect on the relevance of the research to the development of theory in the subject area.

The methodological approach used in this thesis has made use of a number of approaches that are often used in isolation to one another. The integration of these methodologies challenges the argument against mixed methodology. The methodologies have been used in a novel way to address the multi-faceted research problem. The integrated approach serves to tackle both the subjective and the

objective aspects of incorporating sustainability into the financially driven procurement system.

SSM has been used as a flexible framework as advocated by its authors (Checkland and Scholes 1990). Published studies that have used SSM have used the CATWOE method religiously. This method is used to define a system but was found to be too rigid for the definition of sustainability. The Grounded Theory approach was used in its place. This combination of research approaches has shown that the SSM approach can be used as flexibly as its authors suggest. The ConSus model is based on the Delphi method (Linstone and Turoff 1975). This methodology has also been developed to respond to the subjective context of the research subject. The use of Delphi in this research has integrated an element of qualitative analysis which has not been apparent in previous research using this methodology.

The novel use of the range of methodologies emphasises the relevance of selecting research approaches to respond to the specific research questions. The research has presented the successful use of a mixed methodological approach.

8.4 Relevance in Practice

The research has potential for improving the way in which RICS practitioners address the issue of sustainability within the procurement of building projects. Consultants must demonstrate an ability to integrate sustainability into the procurement of social housing. Offering clients a structured approach to sustainability is now an essential part of the advice housing associations require. The ConSus model provides this structured approach and presents a tool for aiding decision making towards meeting the objectives of the housing agency funding body. More importantly it stands to integrate sustainability more effectively into new social housing projects. As an increasing sector within the construction industry this has a relevant role to play in helping the construction industry as a whole become more sustainable.

Each phase of this research has been firmly grounded in practice. The propositional model emerging out of the grounded theory study was formed from the perceptions of the practitioners. The survey tested this model in the real world. The ConSus model has been designed and tested for use in practice as a product of the earlier phases of research. The social housing sector is inundated with practical guidance and policy rhetoric on what sustainability means. The toolkits available to the social housing sector (Talbot 2001; Long 2001) provide comprehensive but overwhelming lists of actions that housing associations are recommended to incorporate into their projects. This research has revealed a need for project specific assistance on integrating sustainability in a meaningful way. The research addresses this need in the development of a model designed to provide a set of features applicable in practice.

The filters identified in the literature review (Figure 2.5) sift the understanding of sustainable development from its global definition to its interpretation at project level. The most direct influences on sustainable development at project level are the interpretation of social housing SD policy and the procurement approach. Filter one is determined by the expertise, knowledge, perception and experience of the individuals involved in the procurement of a social housing project. Each individual brings their own value laden judgements to the project. The ConSus model aims to formalise these judgements and allow the group of project stakeholders to make decisions that incorporate these influential contextual factors. The development of this model provides a practical tool for use by practitioners involved in the procurement of a building project. When tested with housing association development managers the model proved easy to use and feedback has been positive.

The ConSus model provides a way in which sustainability can be defined for a project. It is designed to incorporate all 'experts' involved in the procurement

system and encourage the sharing of knowledge and 'expert opinion'. This aspect of the model makes it especially relevant for use in partnered procurement. Integration of 'expert opinion' can assist in defining a meaningful definition of sustainability.

8.5 Limitations of the Research

The research has been conducted during a period of significant change within the social housing sector. Sustainable development was introduced as a funding criterion of social housing procurement mid-way through this research. The effect of this change is difficult to gauge through the findings of the research. The perception of individuals has been developed through a short cycle of experience within the new funding framework. The housing agencies themselves were not clear on how the issue of sustainable development should be dealt with. The changing context of the research means that the findings are based on a shifting concept. This provides scope for additional research in the future. This aspect of the study has been addressed in the development of the ConSus model. It is designed for iterative use to capture the immediate issues on sustainability as they relate to the procurement of a building project. This means that the features of sustainability emerging out of the use of the model can be revisited on a regular basis. This aspect of the model introduces an element of future proofing.

The grounded study was conducted with a small group of participants. The findings out of this study have been verified by the questionnaire survey and there is confidence in the reliability of the findings. Access to the participants in the grounded study was in an environment removed from the pressures of the procurement system. The interviews did not relate to specific projects and therefore the perceptions of sustainability emerging out of the study represent general views. This allowed the study to provide a substantive theory that can lead to a generalised formal theory. The findings represent a grounded theory of sustainability for the social housing sector. The issues emerging out of the study are specifically related to the context of social housing. This means that the findings cannot be generalised to

the whole of the built environment. However the methodological approach and the ConSus model are transferable and this presents the opportunity to develop a broad grounded theory of sustainability for the built environment.

8.6 Scope for Further Work

The research has created many potential avenues for further work to benefit both the development of academic and practice based knowledge and expertise. There is great potential for knowledge transfer of the findings to practitioners and the wider academic community. This provides the opportunity to effect cultural change

The grounded model that emerged from the research represents a snapshot of the understanding of sustainability during a period of significant change in the social housing sector. The findings were confirmed by the large scale survey conducted with housing associations across the UK. The research suggests several areas for further work.

Development of the ConSus model to increase its interactivity

The ConSus model presently is in a fairly simple format. The model has been designed to present a professional appearance. The web-based application allows the features of sustainability to be input according to the emergent aspects from a workshop. Presently the model collects data from the participants in a format that is not readily collated. The 'behind-the scenes' features of the model will benefit from some improvements.

It is envisaged that the model will incorporate facility for an online forum. In its current format the features used in the model were developed in a face-to-face workshop. This resource would allow a virtual workshop to take place. This permits the sharing of 'expert opinion' between stakeholders that are either spread geographically or not available at the same time. This option would also allow the

feedback on ranked features to happen in anonymity, a positive feature of the ConSus model.

Data collection and data collation can readily be automated within the ConSus model. This user friendly feature can be designed to create 'output reports' from the use of the model. These reports present the features and the ranking selected by the group and form a decision aid within the procurement process. Improving certain features of the ConSus model will provide a framework that can deliver usable output for any procurement team within a very short period of time. Ease of use and transparency are important features for the success of the ConSus model

Development of a grounded theory with general application to procurement projects.

The qualitative research succeeded in developing a grounded model specific to the social housing sector. The approach has proved very successful in producing a meaningful definition of sustainability for a specific sector. This allows an understanding of procurement criteria relating to sustainability to be made explicit. The paradigm models are firmly grounded in the social housing sector. The same grounded theory approach can be used to identify the understanding of sustainability for other sectors of the construction industry. This approach would allow the interpretation of sustainability as it applies to other types of procurement. The grounded model has proved useful in identifying the gap that exists between policy and practice in the social housing sector. By considering other sectors a cumulative theory of sustainability can be built up. Sustainability is essential to the future of the built environment. The concept is still evolving and it is certain that it will become a more important part of procurement in the future. There is scope to repeat the study at a time when sustainability has had time to integrate more fully into the procurement system.

Further work on creating policy that relates to practice more closely.

The gap that has been identified between policy and practice in social housing procurement presents a significant problem to the ongoing delivery of sustainability. Funding is being distributed using sustainability criteria defined in policy. This policy has been shown to differ from the practice comprehension of sustainability. The ConSus model attempts to define the features for a specific project. It is feasible to use the ConSus model to develop sustainable development policy. The format of policy would then be able to be compared readily with the individual project features. This comparison would allow project stakeholders to identify how well a project responds to the policy objectives. This approach gives transparency to the identification of sustainability in both policy and practice.

8.7 Final Reflection

This research has involved a range of methodologies, each with their own challenges and nuances. The integration of these methodologies was chosen to address the complexity of sustainability. The mixed methodology has allowed the subjective issues to emerge holistically using a qualitative approach while structuring them within a quantitative framework. The creation of the model presents a realistic practical tool for delivering sustainability through the procurement process. Also, by adopting a mixed methodology, it has been possible to gain experience in the use of qualitative and quantitative research. Although this represented more than one (often steep) learning curve, the skills gained have given a broad background to tackle further research. The mixed methodology opened up a considerable amount of background reading which increased the already vast task of reviewing the literature.

This thesis has been a journey. It has taken the author through the wide landscape of research in an attempt to find an appropriate way of understanding sustainability. The experience has been exciting, frustrating, a massive learning process, but above all rewarding. The lessons learnt in how to approach research, integrate it with full

time work and home life, and organise the writing have been invaluable. It marks the culmination of three years of hard work in an area that has always interested me, and now presents a wonderful opportunity for further research.

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Appendices

Appendix A

Detailed models from Grounded Theory Emergent Model of Sustainability

Appendix B

Letters for questionnaire

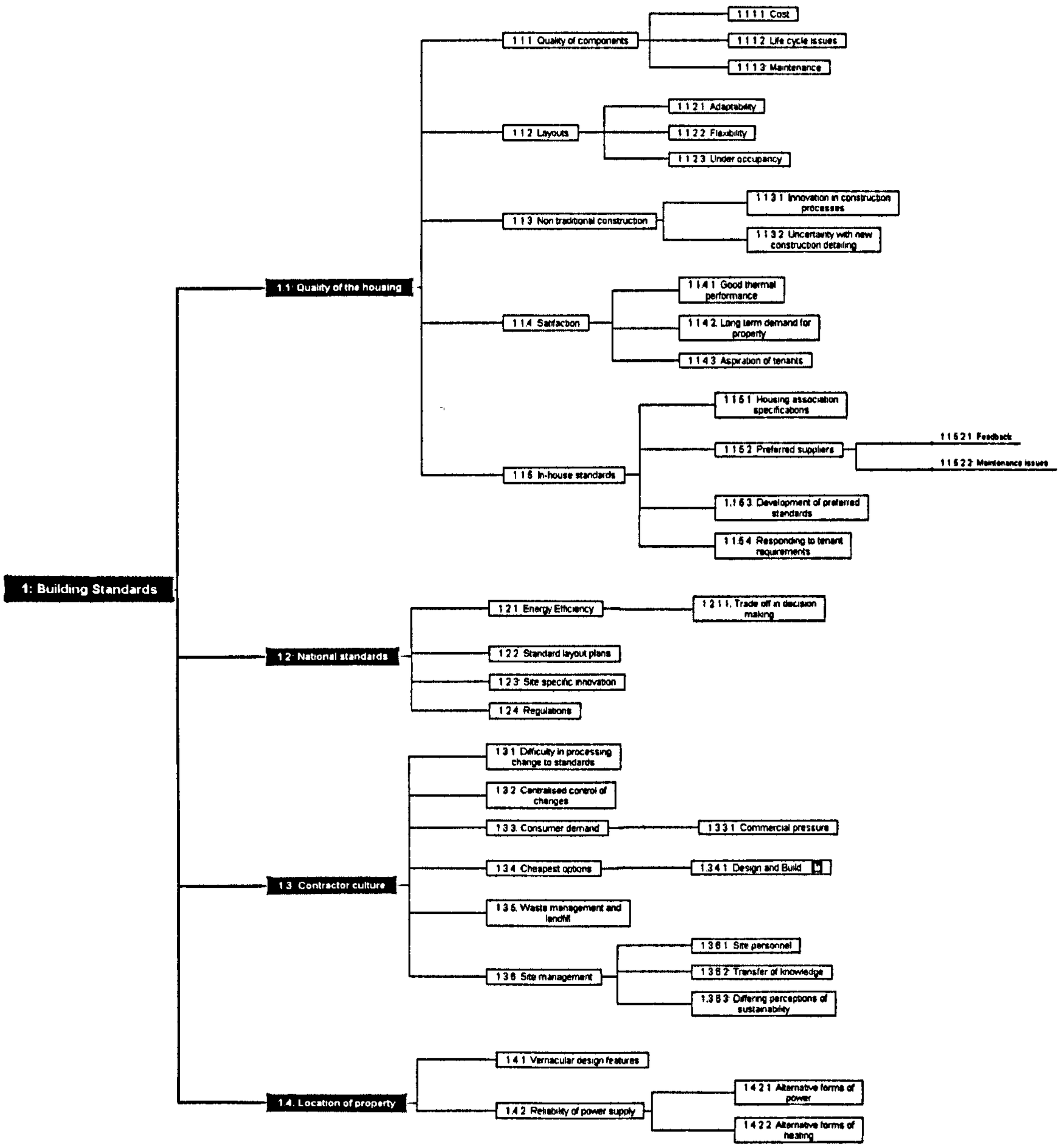
Questionnaire

Appendix C

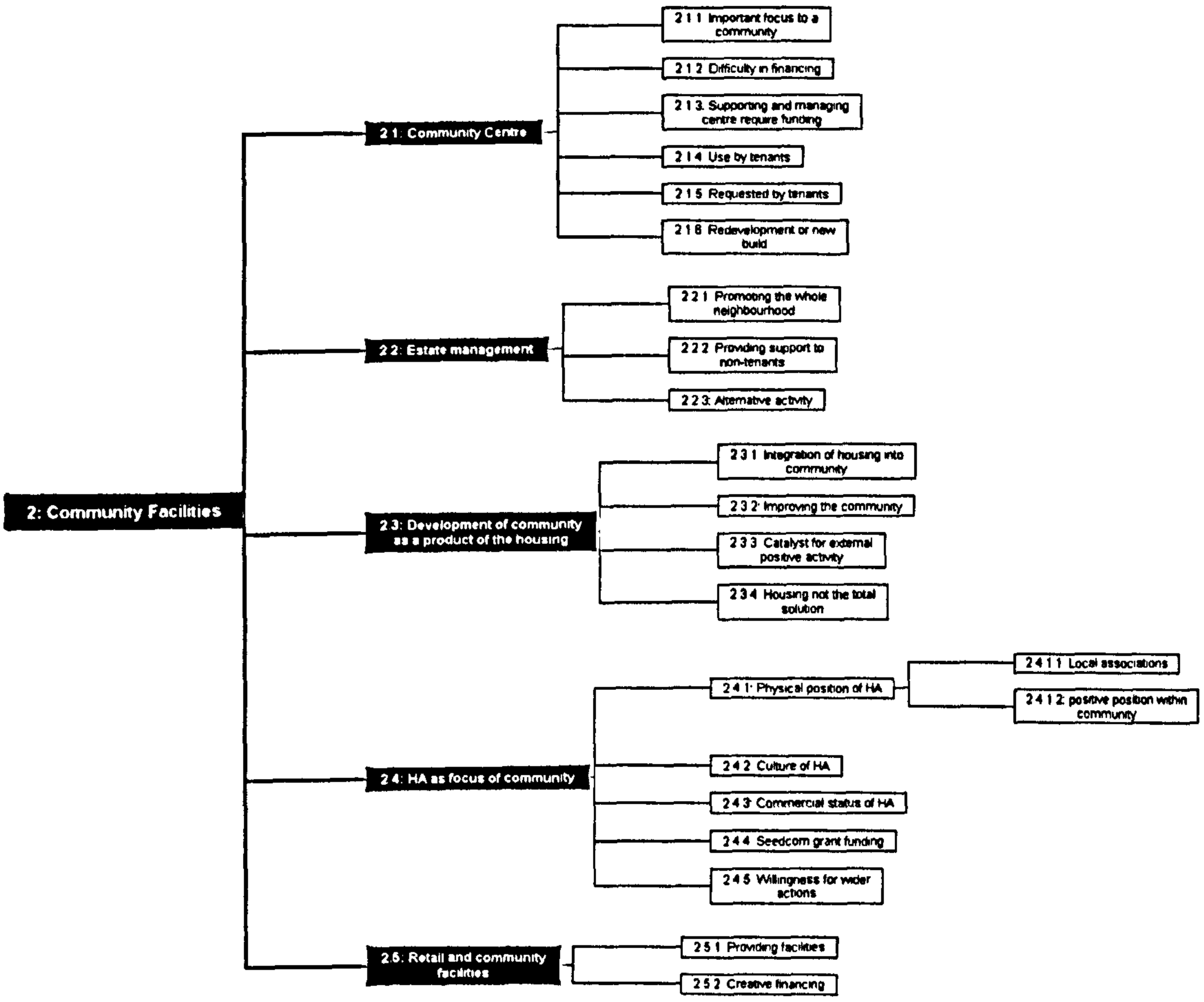
Issues emerging from ConSus workshop

Appendix D

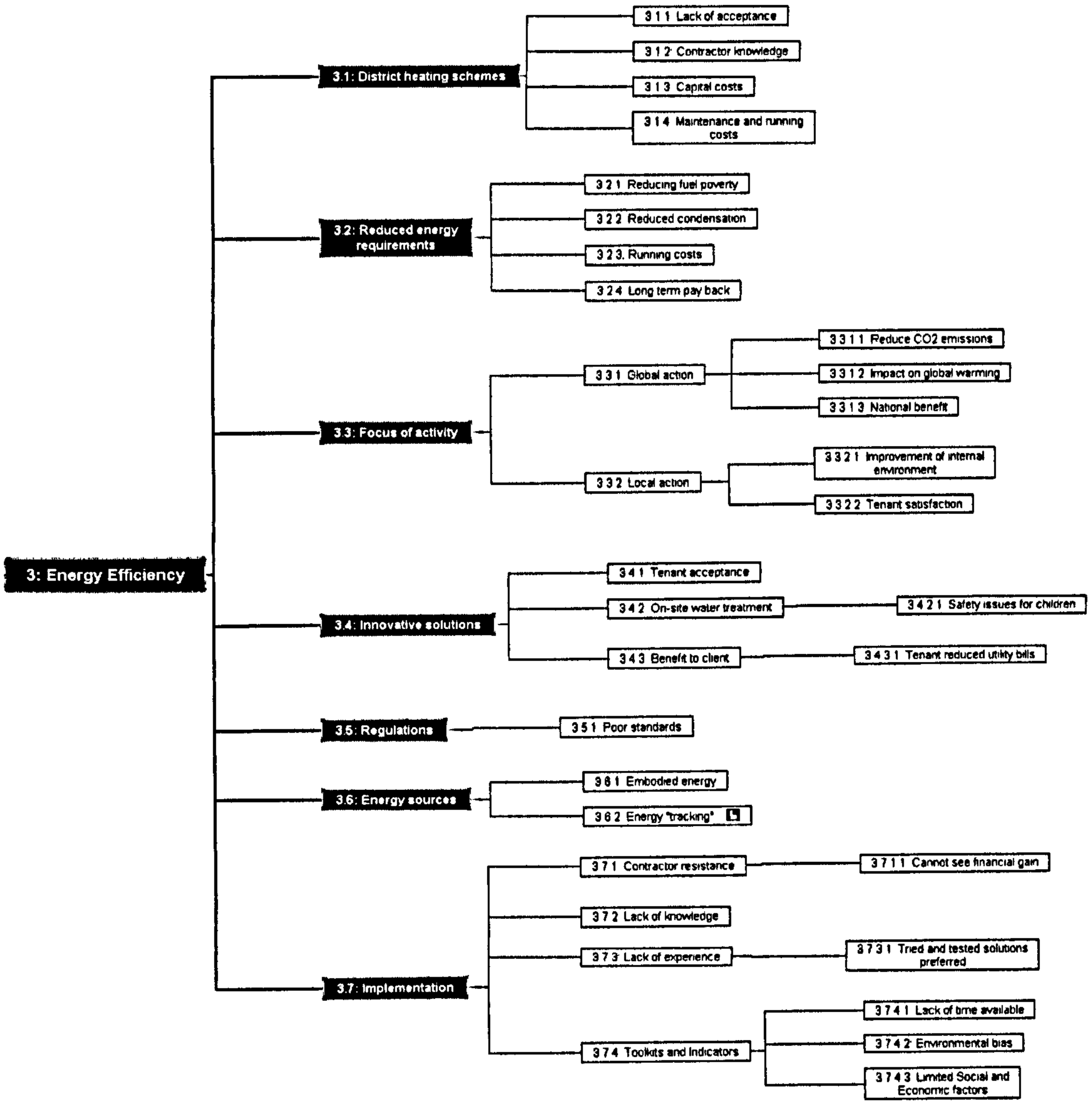
List of publications



Detailed model of Building Standards



Detailed model of Community Facilities



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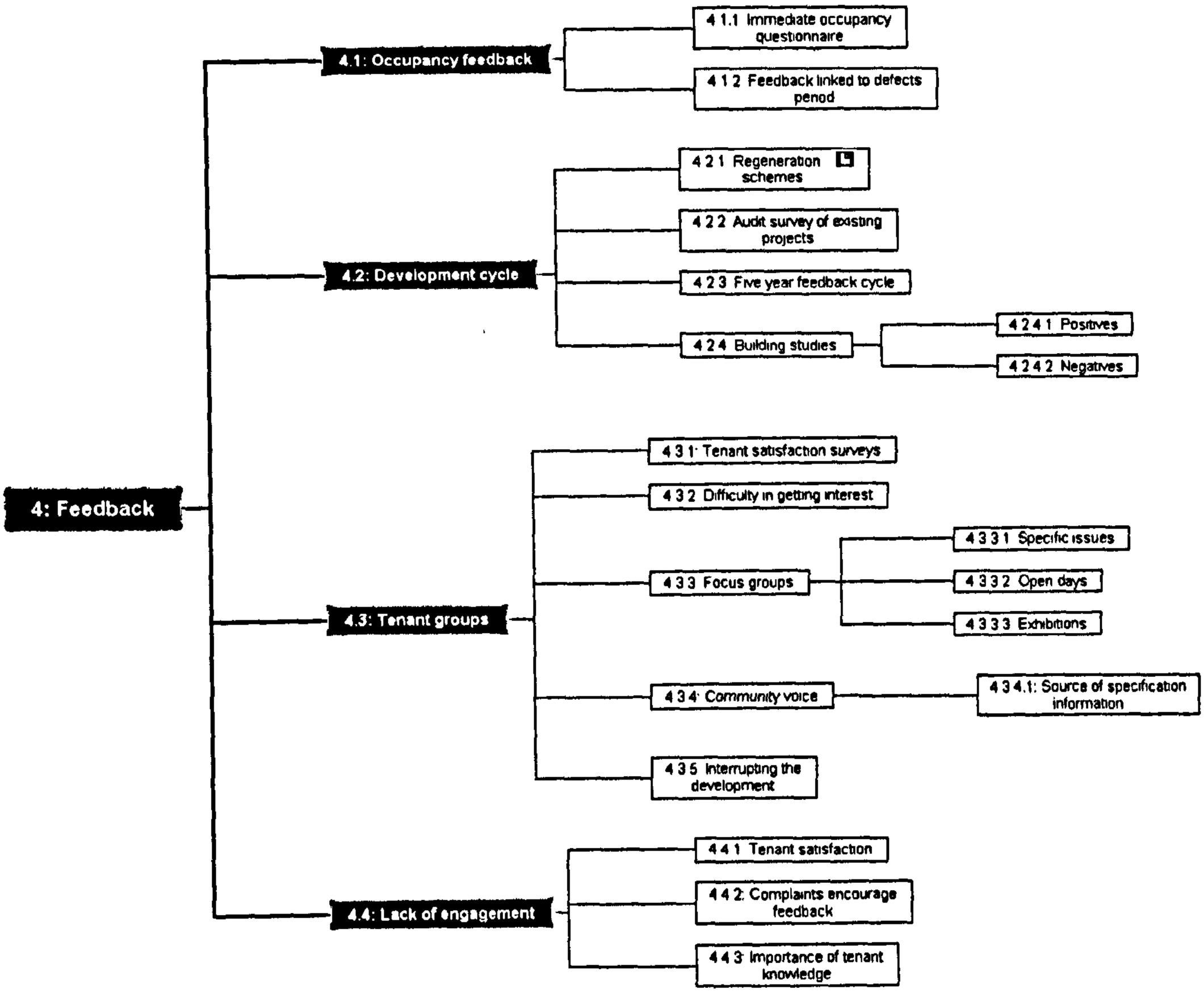
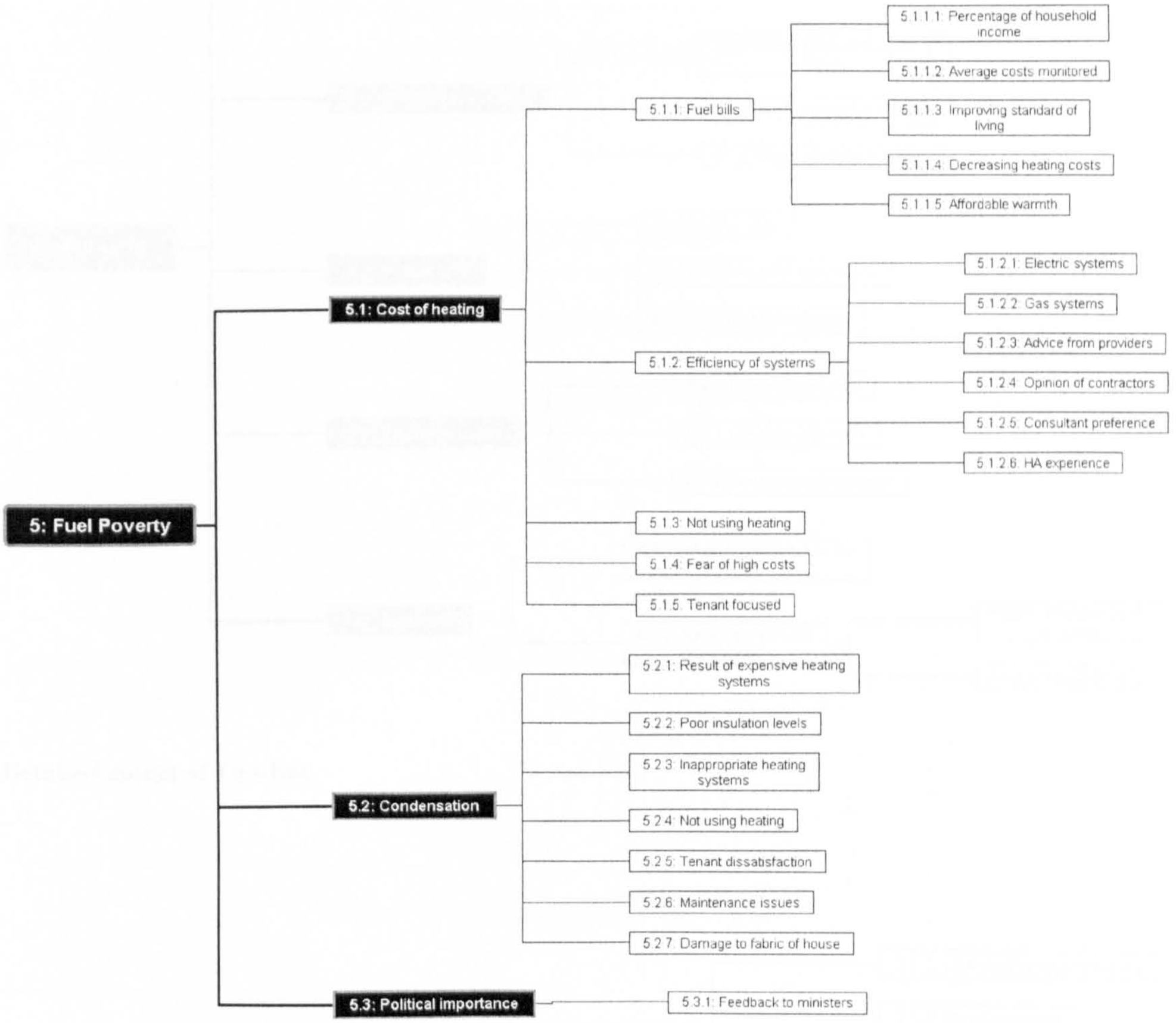
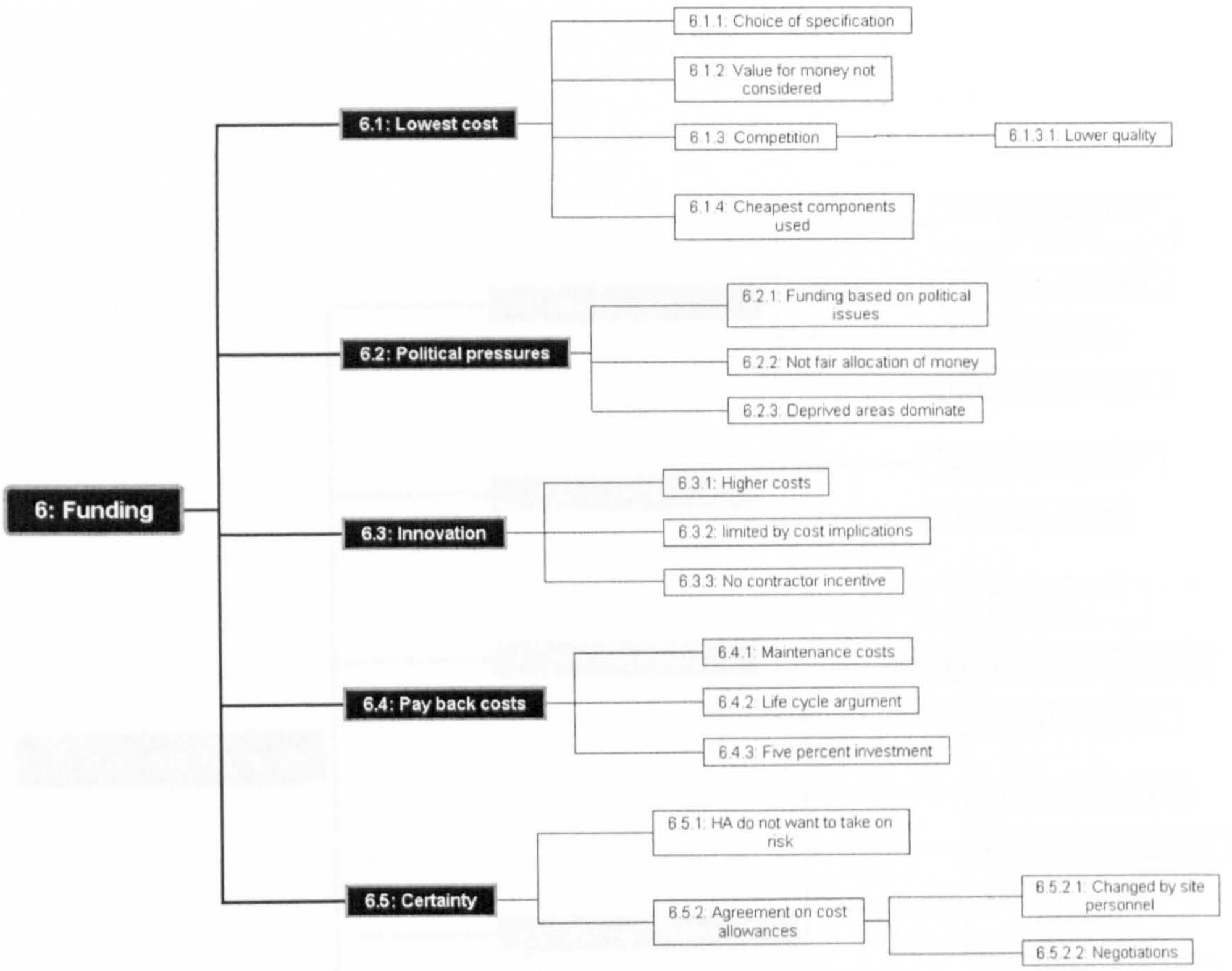


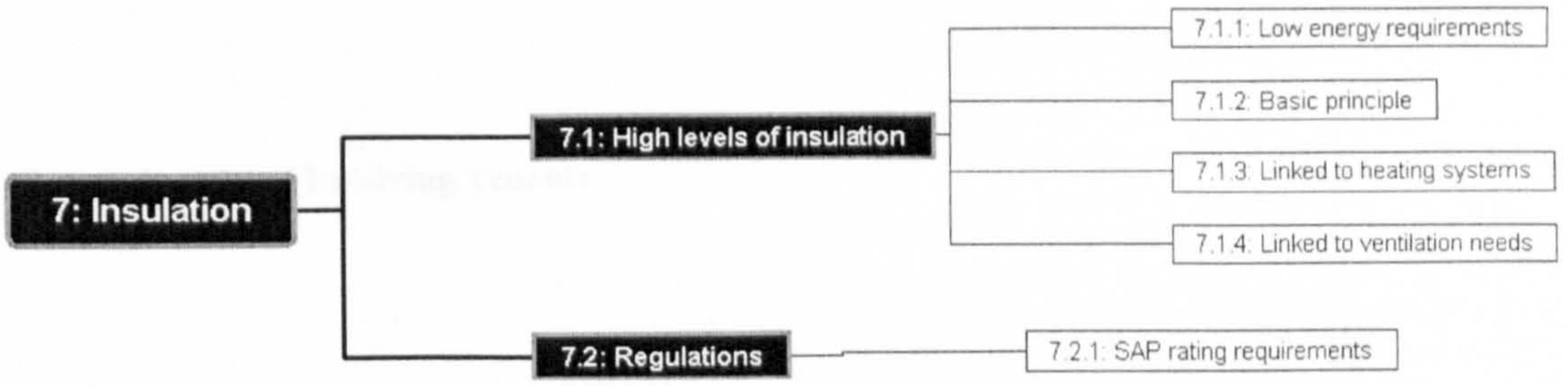
Detailed model of Feedback



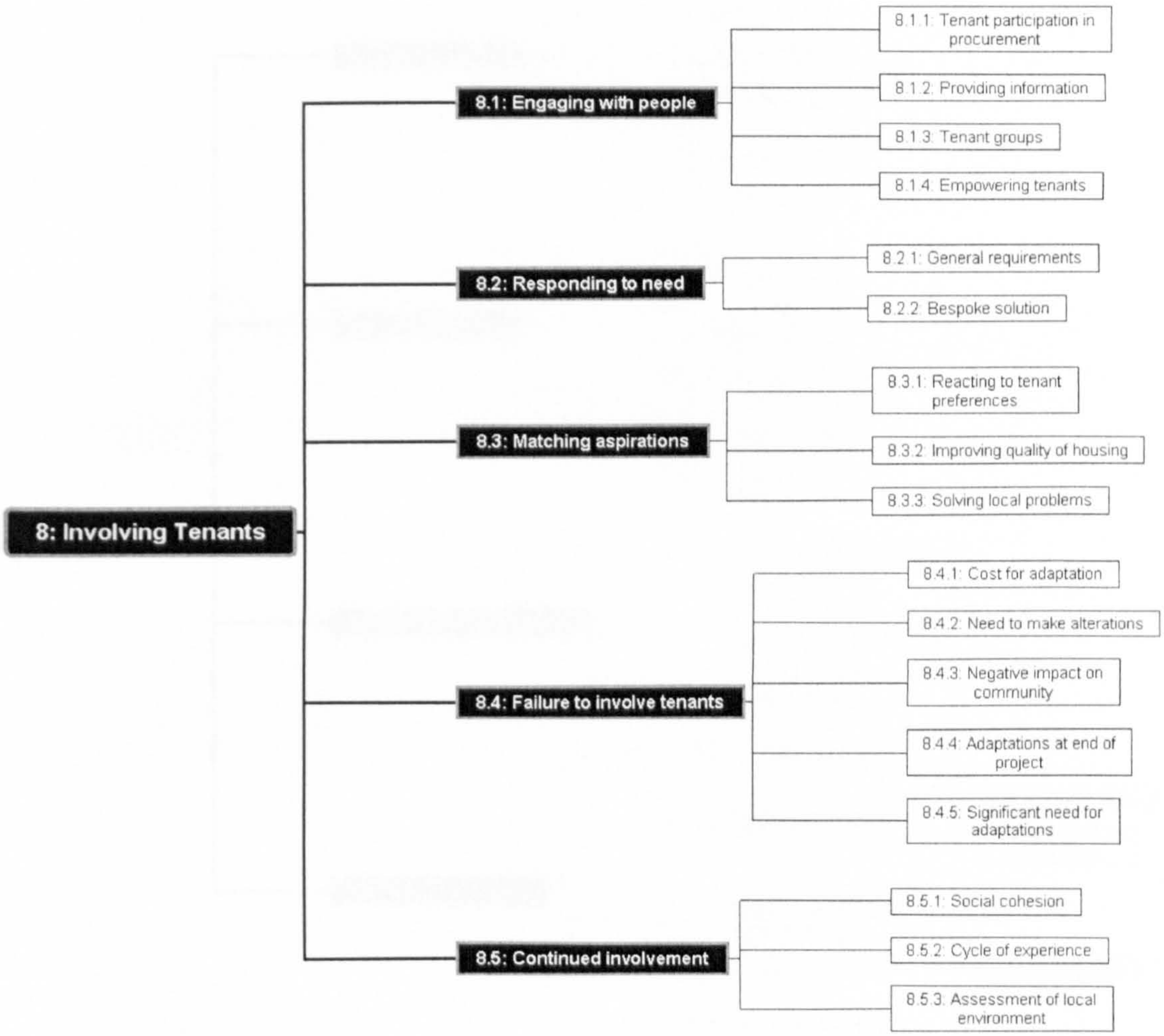
Detailed model of Fuel Poverty



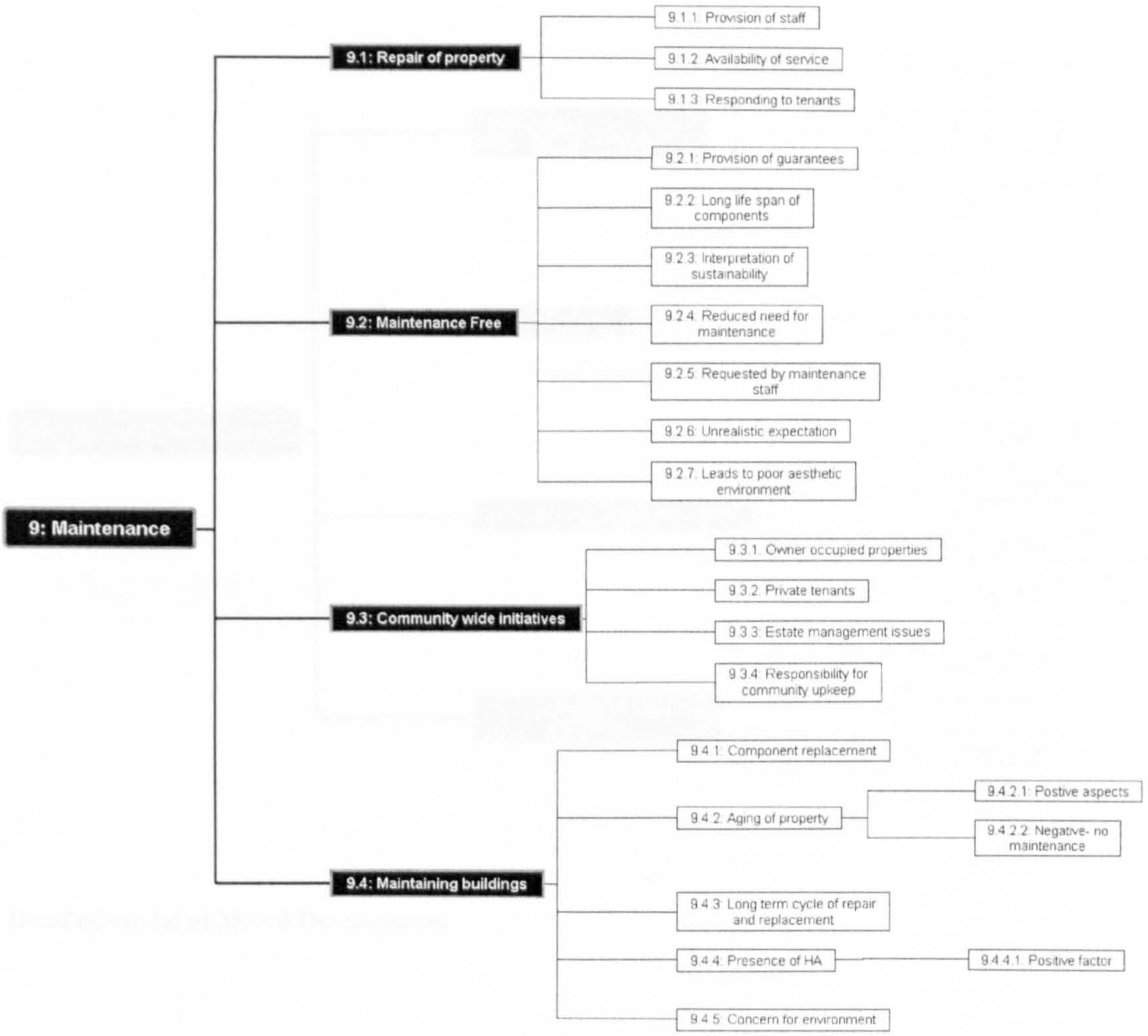
Detailed model of Funding



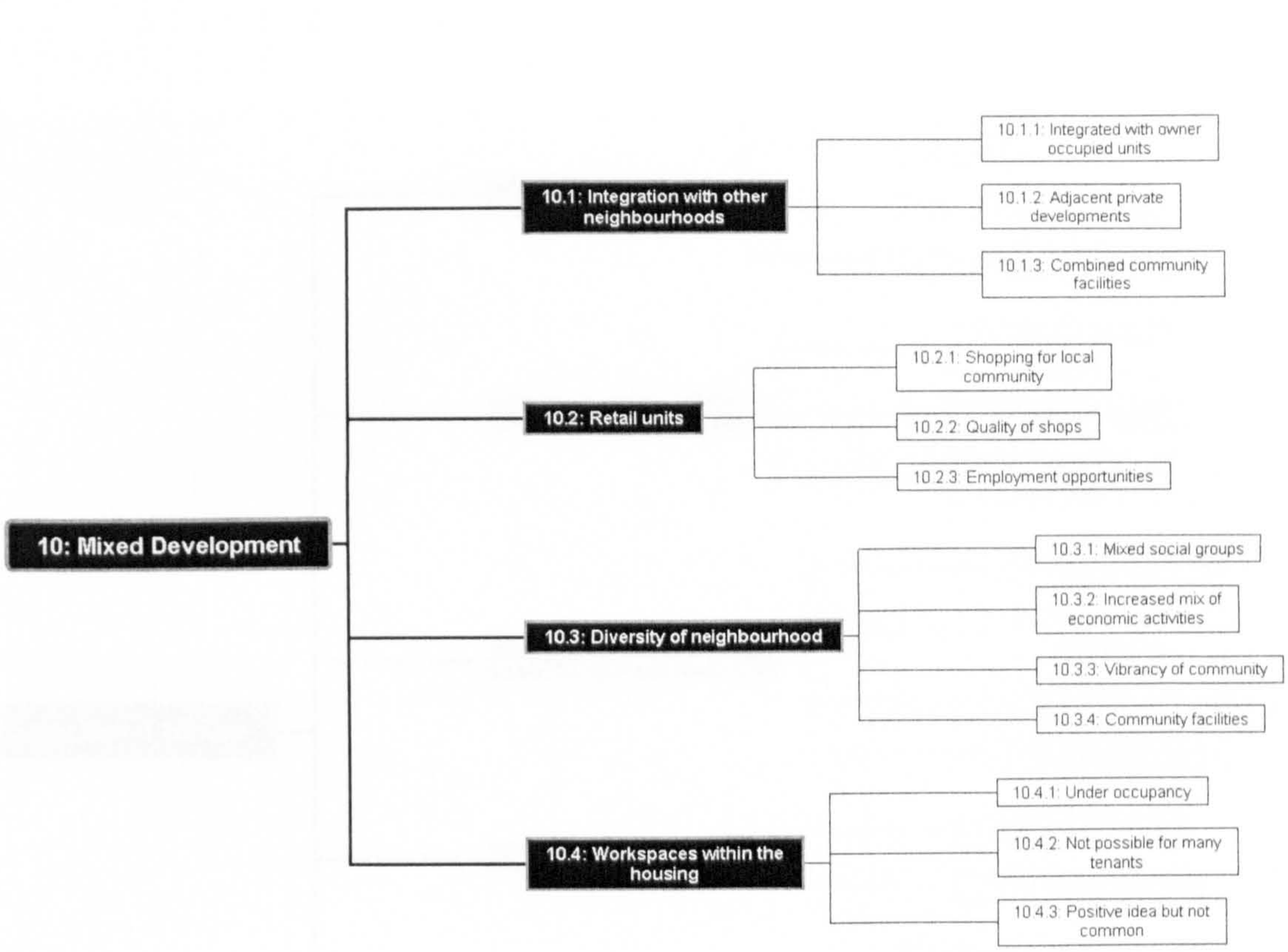
Detailed model of Insulation



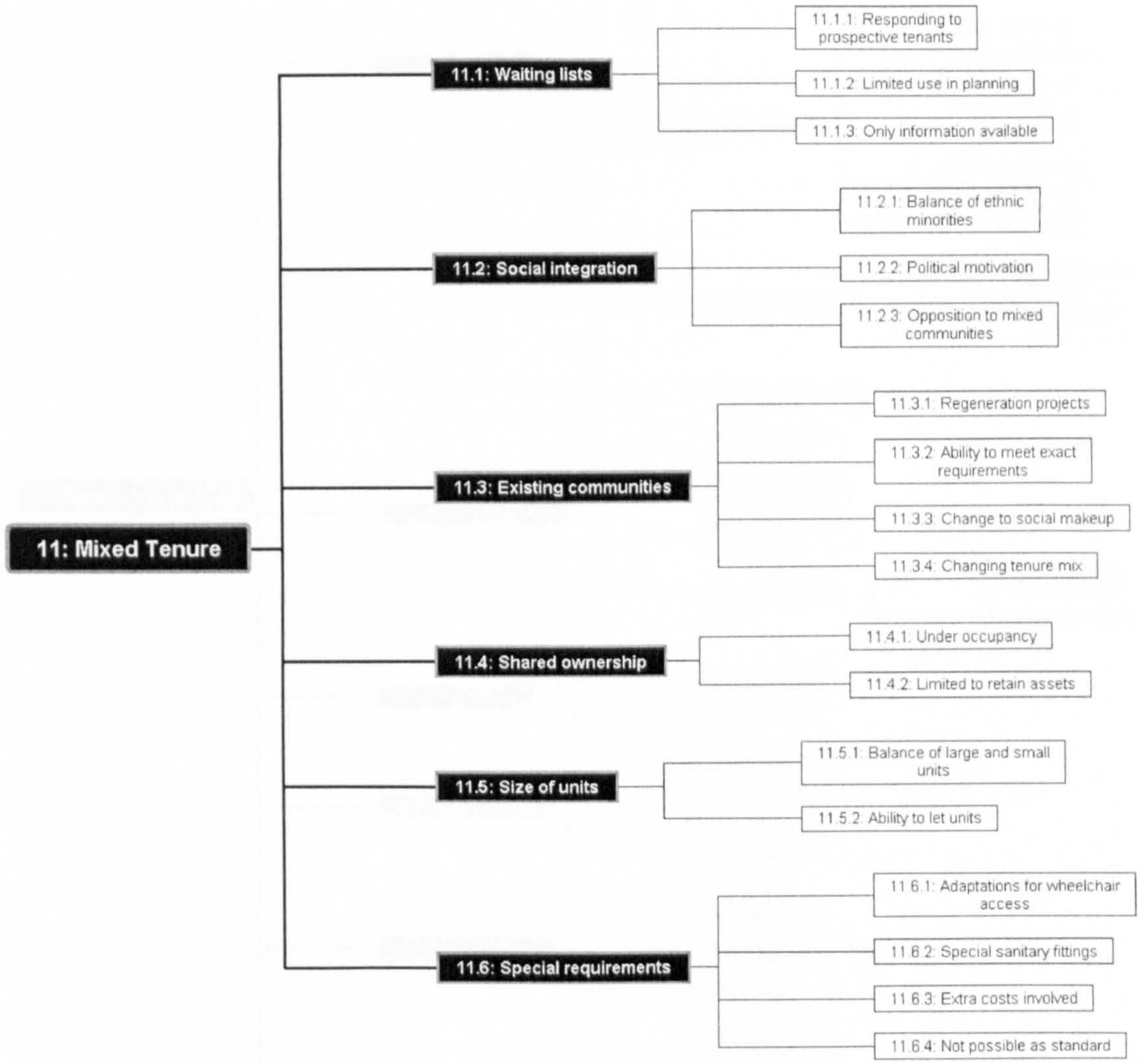
Detailed model of Involving Tenants



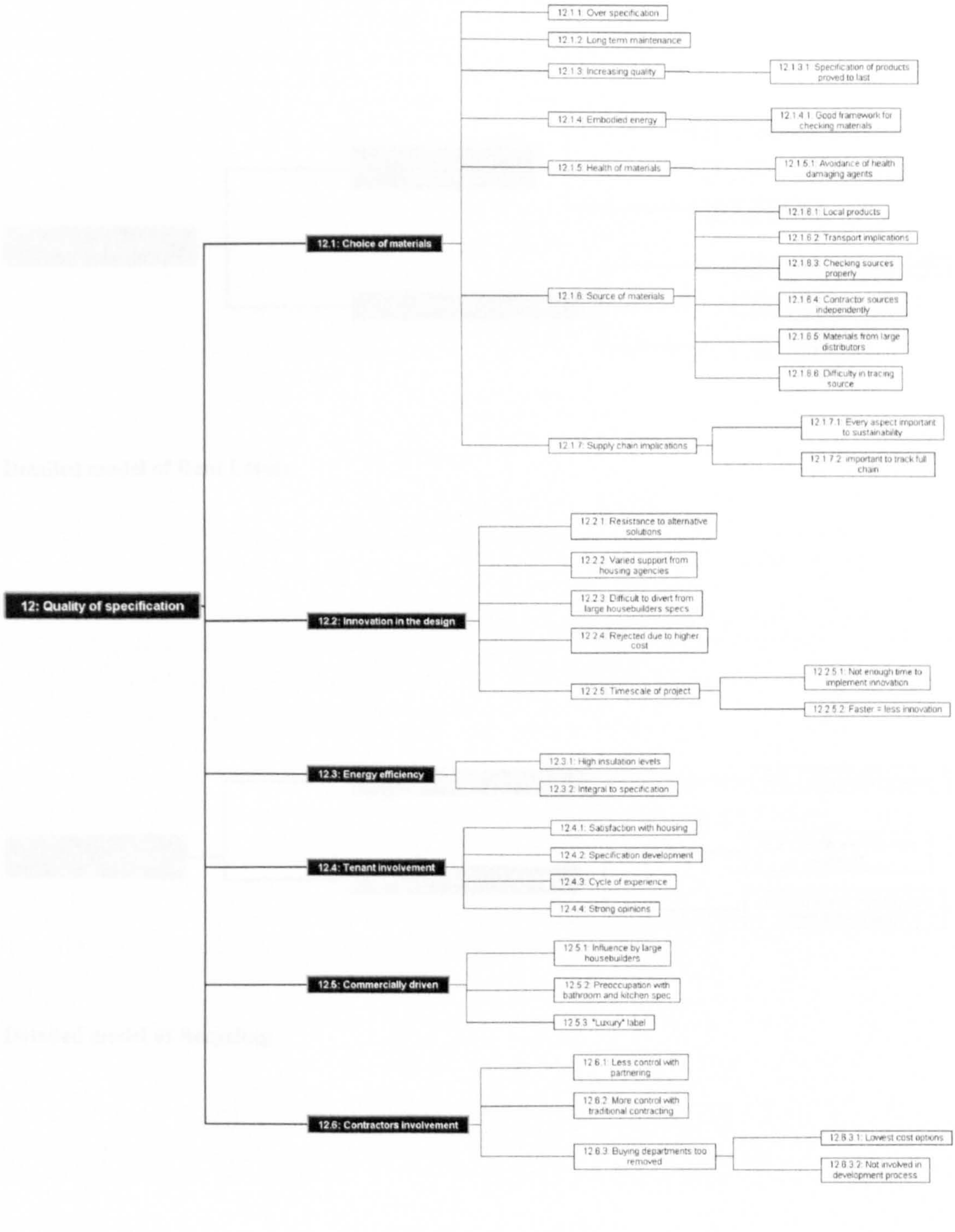
Detailed model of Maintenance



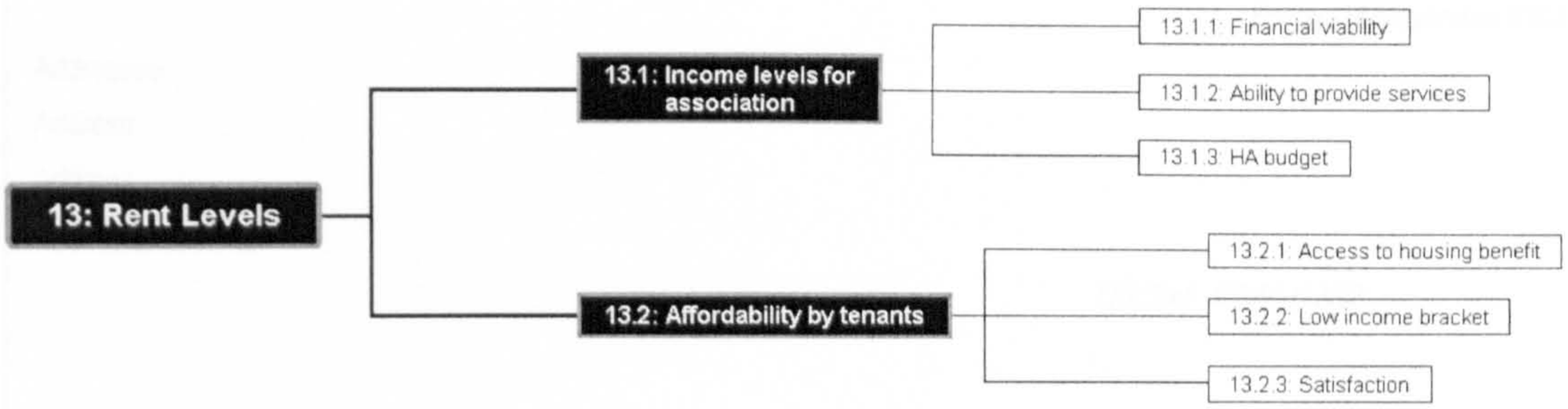
Detailed model of Mixed Development



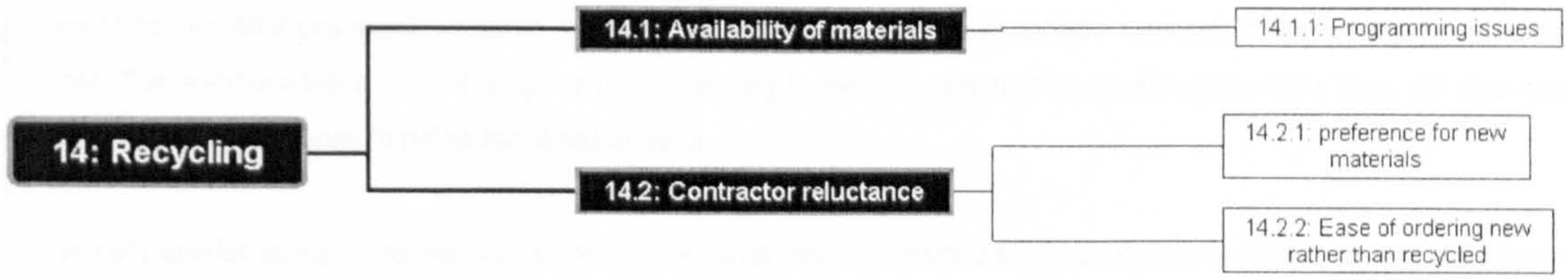
Detailed model of Mixed Tenure



Detailed model of Quality of Specification



Detailed model of Rent Levels



Detailed model of Recycling

Friday, 14 November 2003

Addressee

Address

Address

Our Ref : KC/PL/13/03

Dear Addressee,

PILOT STUDY Sustainability and Partnering in the Social Housing Sector

I am carrying out research into sustainability and partnering in the Social Housing sector. I am contacting you to enquire if you would be willing to assist me in developing a questionnaire to be circulated to RSLs in England and Scotland. A small cross sample of RSLs across the UK have also been approached.

I would appreciate if you would complete the enclosed questionnaire and then provide feedback on the attached comments sheet. The questionnaire is at pilot stage and I am seeking to refine it prior to its main circulation Your input will allow the questionnaire to be shaped to reflect the needs of RSLs.

If you any queries about the research in general or the questionnaire in particular, please do not hesitate to contact me. I thank you in anticipation of your assistance in developing this research.

Kind regards

Kate Carter

Lecturer in Construction Management

Room 2.27 EC

Email: k.carter@sbe.hw.ac.uk

Tuesday, 13 January 2004

The Development Manager
1066 Housing Association
Queensbury House
Havelock Road

Hastings
East Sussex

TN34 1BP

Our Ref : KC/QU/1/RSL

Dear Sir or Madam,

Sustainability and Partnering in the Social Housing Sector

I am conducting research supported by the RICS Foundation. The research aims to develop a profile of the understanding and application of sustainability and partnering by RSLs and those involved in the procurement of social housing. This information will aid the development of a decision making protocol for sustainable social housing.

A large sample of RSLs is being invited to take part in completing this survey. A similar survey has been sent to consultants and contractors across the UK. The Housing Corporation and Communities Scotland have also been invited to take part in this survey.

Thank you for taking the time to complete this survey. Please be assured that all information received will be treated with the utmost confidentiality. If you want to contact me or require any further information please use the following address, phone number or email address. The results will be made available to all those that indicate an interest.

If you are unable to complete the survey, please feel free to pass it on to a colleague.

Kind regards

Kate Carter

Kate Carter
Richard Lay Research Fellow

SIZE OF ORGANISATION

QUESTION 1
How many units are owned or managed by the RSL

	Owned	Managed
0	☐	☐
1-5	☐	☐
6-25	☐	☐
26-100	☐	☐
101-250	☐	☐
251-1000	☐	☐
1001-2500	☐	☐
2501-10000	☐	☐
Over 10000	☐	☐

QUESTION 2
Do you carry out development work?

Yes ☐ Go to Q2a
No ☐ Go to Q4

QUESTION 2a
Is the development work carried out:

Locally ☐
Regionally ☐
Nationally ☐

QUESTION 3
How many units are / were / will be developed by your organization between April and March of

	Refurbished	New Build
Last year		
Current year		
Next year (projected)		

N.B. Refurbished units are existing units that are brought into use by the RSL for the first time or as part of a major redevelopment. This excludes regular maintenance.

SUSTAINABILITY

QUESTION 4
Do you have a Sustainable Development policy?

No ☐ Go to Q4a Yes ☐ Go to Q4b

QUESTION 4a
If no, do you intend to develop one?

No ☐ Go to Q7 Yes ☐ Go to Q5

QUESTION 4b
If yes how long has it been in place?

Up to 1 year ☐
1 – 3 years ☐
3-5 years ☐
5+ years ☐

QUESTION 5
To what extent does the Sustainable Development policy (existing or planned) focus on:

- ENVIRONMENTAL
- ECONOMIC
- SOCIAL
factors

Shade in nine Segments on the diagram to represent the focus of the SD Policy.

Example - 2/9 social, 3/9 Economic, 4/9 Environmental

QUESTION 6
How important are the following areas to your Sustainable Development Policy?

	Essential	V Important	Important	Secondary	Unimportant
Building standards	☐	☐	☐	☐	☐
Community facilities	☐	☐	☐	☐	☐
Energy efficiency	☐	☐	☐	☐	☐
Feedback	☐	☐	☐	☐	☐
Fuel poverty	☐	☐	☐	☐	☐
Funding	☐	☐	☐	☐	☐
Insulation	☐	☐	☐	☐	☐
Involving tenants	☐	☐	☐	☐	☐
Maintenance	☐	☐	☐	☐	☐
Mixed development	☐	☐	☐	☐	☐
Mixed tenure	☐	☐	☐	☐	☐
Quality of spec.	☐	☐	☐	☐	☐
Recycling	☐	☐	☐	☐	☐
Rent levels	☐	☐	☐	☐	☐
Other:.....	☐	☐	☐	☐	☐
Other:.....	☐	☐	☐	☐	☐
Other:.....	☐	☐	☐	☐	☐

PARTNERING

QUESTION 7
Do you undertake partnering for development work with: (please tick the appropriate boxes)

	Project partnering	Strategic partnering
Consultants	☐	☐
Contractors	☐	☐
Sub-contractors	☐	☐
Suppliers	☐	☐
Other housing associations	☐	☐

QUESTION 8
Which of the following areas are benefited by partnering as opposed to traditional contracting and by how much?

	Major benefit	Medium	Minor benefit	No benefit
Financial savings	☐	☐	☐	☐
Housing quality	☐	☐	☐	☐
Working relationships	☐	☐	☐	☐
Community gains	☐	☐	☐	☐
Design processes	☐	☐	☐	☐
Construction processes	☐	☐	☐	☐
Reduced conflict	☐	☐	☐	☐
Improved trust	☐	☐	☐	☐
Time savings	☐	☐	☐	☐
Cultural change	☐	☐	☐	☐
Other:	☐	☐	☐	☐
Other:	☐	☐	☐	☐

QUESTION 9
There is a strong link between Sustainable Development and the following forms of procurement:

	Strongly agree	Agree	Uncertain	Disagree	Strongly disagree
Partnering	☐	☐	☐	☐	☐
Design and Build	☐	☐	☐	☐	☐
Traditional contracting	☐	☐	☐	☐	☐

QUESTION 10
The following forms of procurement are able to deliver Sustainable Development:

	Strongly agree	Agree	Uncertain	Disagree	Strongly disagree
Partnering	☐	☐	☐	☐	☐
Design and Build	☐	☐	☐	☐	☐
Traditional contracting	☐	☐	☐	☐	☐

THANK YOU FOR COMPLETING THE QUESTIONNAIRE.
Would you be willing to take part in a short interview to explore the issues of sustainability and partnering in social housing?

If so, please supply your name and either a contact email or phone number.

Name _____

RSL _____

Contact email _____

Phone number _____

KC/04/RSL/___

School of the Built Environment
Sir Edwin Chadwick Building
Heriot-Watt University
Edinburgh
EH14 4AS

HERIOT WATT UNIVERSITY

Error!

SUSTAINABILITY and PARTNERING IN THE SOCIAL HOUSING SECTOR

If you have any queries about this research, contact:

Kate Carter
Tel: 0131 451 3817
Email: k.carter@sbe.hw.ac.uk

Supported by Housingnet.co.uk

Tuesday, 27 April 2004

The Development Manager
1066 Housing Association
Queensbury House
Havelock Road
Hastings
East Sussex
TN34 1BP

Our Ref : KC/QU/1/RSL

Dear Sir or Madam,

Sustainability and Partnering in the Social Housing Sector

I am conducting research supported by the RICS Foundation. Earlier this year this questionnaire was sent out to a large number of RSLs. We have had a good response and we want to give you another opportunity to take part in this survey. Your response is important to us and we hope that you will be able to spend a few minutes completing this survey.

The research aims to develop a profile of the understanding and application of sustainability and partnering by RSLs and those involved in the procurement of social housing. This information will aid the development of a decision making protocol for sustainable social housing.

Thank you for taking the time to complete this survey. Please be assured that all information received will be treated with the utmost confidentiality. If you want to contact me or require any further information please use the following address, phone number or email address. The results will be made available to all those that indicate an interest.

If you are unable to complete the survey, please feel free to pass it on to a colleague.

Kind regards

Kate Carter

Kate Carter
Richard Lay Research Fellow

ENVIRONMENTAL

Reduce asphalt / paving
Reduce runoff
Reduce/ manage flooding
Reduce car usage

Maximise use of land
Build high density if appropriate and desirable

Performance measurement???

Encourage the use of renewable energy
Renewable resources
Embodied energy
Energy minimisation
Alternative energy forms
Low water usage
Supply of domestic appliances
Sanitary fittings with low flow water

Recycling during construction
Recycling during habitation
Tenant education
Recycling
Reduce emissions
Encourage recycling of
- materials
- garbage
- energy
- water
Recycling materials / water
Use of brownfield sites
Develop sites close to transport links
Car free developments

Increased insulation
Reduce pollution
Reduce CO2 emissions
Efficient transport policy during construction and habitation
Better boilers

Transport of materials
Local materials

Vernacular design
Traditional detailing
Sourcing of materials
Careful selection of materials
Low embodied energy
Use of recyclable materials
Materials with low embodied energy
Materials from sustainable resources

Solar heating passive and active

Waste management strategies
Contractors site operations
Material selection
Ecofriendly materials
Materials/components - waste minimisation /reuse
Transport – cost consequence of the project

Quality of life
Healthy homes

Energy efficiency
Better thermal performance in housing

Landscaping hard and soft
Protection of flora / fauna

Natural solutions
Building orientation
Passive solar gain
Earth moving minimised

Innovation – tested?

Occupation
Asset generation

SOCIAL

Affordable
Affordable- cost effective to live in
Avoidance of fuel poverty
Affordable – rent levels
Affordable – running costs

Mixed use – incorporation of retail/ commercial/ other uses
Connected to the larger community
Not isolated
Efficient transportation links
Balance integrated communities
Mix of tenure
Mixed tenure neighbourhoods

Sustainable social housing is part of a sustainable community
Individual and community well-being

Healthy homes
Healthy residents/ tenants
Satisfied customers

Individual and group stakeholders
- Involvement
- Participation
- Development

Site selection – amenity
Site selection - employment
Site selection - transport
Site selection - infrastructure
Site selection – density
Size of site – tenure issues
Size of site – regeneration
Size of site – land release

Deconstruction – demountability
Deconstruction – demolition
Deconstruction – life cycle

Local employment

Equal opportunity in relation to housing and employment initiatives

Creation of safe communities and a reduction in the fear of crime
Encourages "eyes on the street"
Safety for children

Visually acceptable
Contemporary design
Traditional design
Ownership of design
Maintenance of innovation
Aging of building – positive or negative
Aspiration of tenants
Front door/ back door
Pride in neighbourhood community
Sense of Place
Positive contribution to neighbourhood and community
Good architecture
Good public and private spaces

Demand – long term and short term
Fashion
Responds to need as well as demand

Adaptability
Adaptable
Capable of being used for different needs
Home for people of all ages
Flexibility in layout
Homes for life principle

ECONOMIC

Replicability
Replicable – even if it's a demonstration project

Training and employment initiatives
Employment
Training
Access to employment opportunities
Apprenticeships
In-house training
Contractors training schemes
Local labour clauses
Create employment through building work
Residents to work in local job market
Area based contractors

Wealth generation – individuals employment
integration with other trades
Suppliers – focus on components (windows/ doors/ kitchens/

Wealth generation – communities businesses
Create communities to help sustain local economy

Charity funders – lots of form filling
Charity funders – timing of application (annual cycle)
Private funders – mortgage ability
Public funders – prefabrication
Public funders – careful with innovation
Public funders – adhoc process

Sustainable without adding cost
Inexpensive small improvements
Incremental change

Suppliers – leverage to request innovation
Suppliers –

boilers)Supply chain – volume needs bulked up
Supply chain – agreements (contractors)

Supply chain – contractual pricing (volume/ price)
Supply chain – timber prefabrication

Fuel poverty strategies
Thermal efficiency
Alternative fuels
Education on running costs
Thermal efficient housing
Cost effective to live in
Long term maintenance – cost effective to maintain
Evaluation of running costs
Costs in use – running costs
Costs in use – maintenance costs

Affordable rents
Affordability – individual rents
Affordability – community funders

Affordable materials that are also ecofriendly

Long term maintenance criteria
Capital costs
Operation costs
Maintenance costs
Re-use costs
Cost effective to build – local materials, local labour, local resources, well serviced
Upfront costs versus long term life
Build costs – labour, materials
Building life expectancy
Site costs

Economic site selection
Access to economic sites

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